

Faculty of Engineering  
Prince of Songkla University

Final Examination : Semester 1

Academic Year 2010 (2553)

Date : October 4, 2010 ( 4 ตุลาคม 2553 )

Time: 09:00 - 12:00

Subject: 225-347 Production Planning and Control

Room : ห้องหัวหุ่น

ทฤษฎีในการสอบ โทษขั้นต่ำ ปรับตกในวิชาที่ทฤษฎีนั้น  
และพักการเรียน 1 ภาคการศึกษา

**Instruction**

1. Total examination has 6 topics, 17 pages, and 58 scores.
2. Do your examination in these papers and return all of them.
3. Write down your Name, Surname, and Student Code in every page.
4. Show all calculation and assumption.
5. All books, notes and calculators are allowed but you are not permitted to borrow anything from the others.
6. All figures are not to scale.
7. Draw the graph in plain paper and the scale should be approximately close to the fact.

	Scores	Your Scores
1	10	
2	9	
3	10	
4	9	
5	10	
6	10	
Total	58	

No.....

( From the number in examination list )

Name .....

Surname.....

Student Code.....

Year.....

Department.....

Assistant Professor Yodduang Pannara



Name.....Surname.....Student Code.....

1. Describe all the problems with clear statement

1.1 Each year sugar factory produces sugar 4-5 months . The factory closes the rest of the year (7-8 months) . What techniques or management that you will use to handle maintenance of this sugar factory ? ( 2 Scores )

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1.2 You are manager of the factory. In the factory there are maintenance team and production team. Which team do you pay more attention to ? Why ? (2 Scores )

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1.3 Which does maintenance organization that the faculty of engineering, Prince of Songkla University use ? Select from,

- 1) Central Maintenance
- 2) Area Maintenance
- 3) Unit Maintenance

( Explain Clearly)

( 2 Scores )

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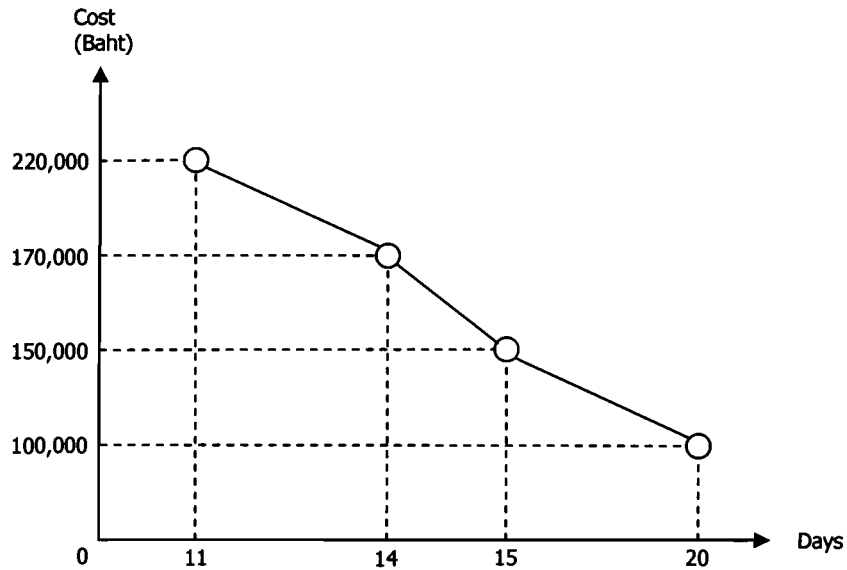


Name.....Surname.....Student Code.....

1.4 Do you agree with this sentence " The factory must increase preventive maintenance to 80% of all maintenance jobs " (Explain clearly) (2 Scores)

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1.5 From PERT, explain the meaning of cost diagram of the activity below



( Figure not to scale )

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( 2 Scores )  
( Total 10 Scores )

Name.....Surname.....Student Code.....

2) From the topic project management with CPM

2.1 Write down the arrow diagram from the data below.

Activity A starts the project

Activity M finishes the project

Activity A starts before activity B,C,D

Activity B starts before activity E

Activity C starts before activity F

Activity D,E,F start before activity G

Activity E starts before activity H

Activity F starts before activity K

Activity K starts before activity L

Activity H,G,K start before activity I

Activity I,L start before activity M

( 6 Scores )



Name.....Surname.....Student Code.....

2.2. CPM Network in figure 2.2.1 and 2.2.2 correct or not

- If it is correct, you must write down that it is correct
- If it is not correct or unsuitable , you must adjust or correct it
- If you do not write anything , your score is zero

2.2.1

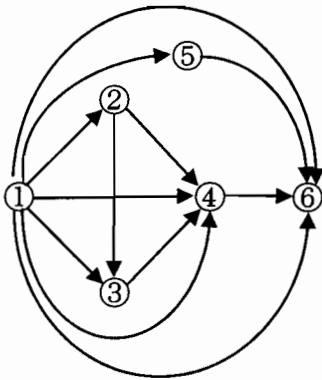


Figure 2.2.1

( 1.5 Scores )

2.2.2

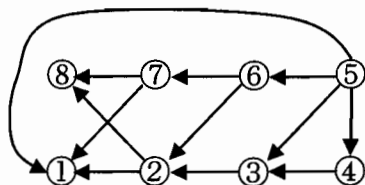


Figure 2.2.2

( 1.5 Scores )

( Total 9 Scores )

Name.....Surname.....Student Code.....

3. From the topic of project management with CPM

From CPM Network in figure 3.1 the number in each path or activity is time (days).

For example, the working time from node ① to node ② is 5 days.

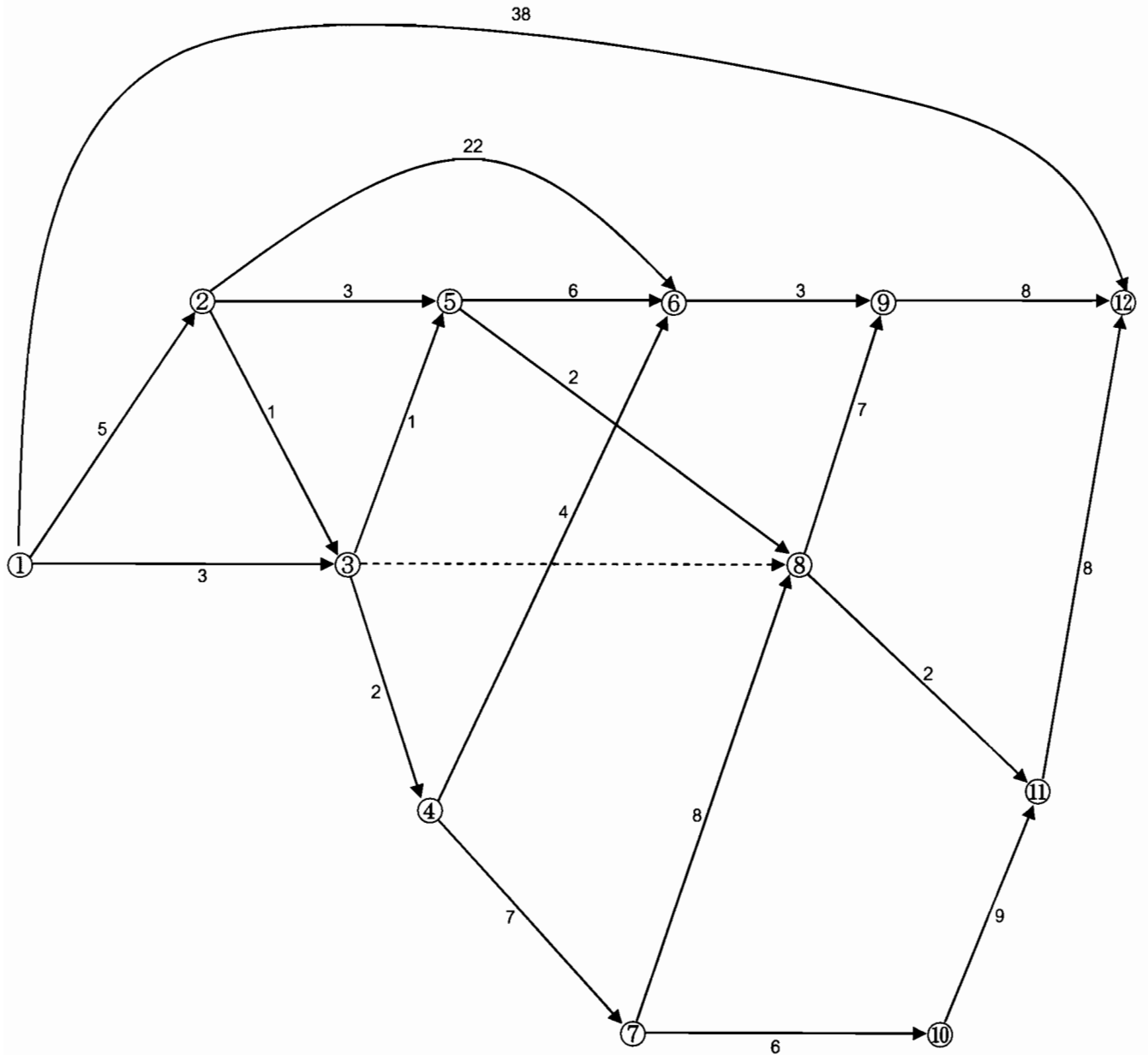


Figure 3.1

Name.....Surname.....Student Code.....

3.1 What is the meaning and benefit of critical path ? ( 1 Score )

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3.2 Show all calculation in figure 3.1 For

3.2.1 Which paths are the critical path ? Show all of them ( 2 Scores )

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3.2.2 What is the value of the critical path ? ( 1 Score )

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3.3 For every activity calculates

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

(4 Scores)

3.4 For every node calculates

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

( 2 Scores )

(Remark you must show the data from 3.3 and 3.4 in figure 3.1)

( Total 10 Scores )



Name.....Surname.....Student Code.....

4. Thai big bike factory produces 4 types of bicycle : Model AF6, NUVO , FANTASIA and PSU9. The profit from AF6, NUVO , FANTASIA and PSU9 is 190 , 240 , 300 , 180 Baht/unit respectively.

The data of production of AF6, NUVO , FANTASIA and PSU9 are below.

- 1). Labors are 20 , 30 , 37 and 18 hours/unit respectively. Total labors are 1780 hours/day.
- 2). Material are 42 , 110 , 142 , and 32 pieces/unit respectively. Total material are 8750 pieces/day.
- 3). Wheels are 2, 3, 4, 2 wheels/unit respectively. Total wheels are 4250 *wheels/month*.
- 4). The marketing team forecasts the sale volume in table 4.1

	Minimum sale (Units/Month)	Maximum sale (Units/Month)
AF6	1400	2175
NUVO	1000	1600
FANTASIA	925	1450
PSU9	2100	3850

Table 4.1

Thai big bike factory works 25 days each month. Use linear programming formulate all the problems to find the best solution for each month (*Formulate only, do not calculate it*)

( 9 Scores )





Name.....Surname.....Student Code.....

5. The welding factory has 2 welding machines: MODULAR and EXTEEM. The capacity of both machines are equal. The fixed expense and depreciation cost of MODULAR is 250,000 baht per month. The fixed expense and depreciation cost of EXTEEM is 320,000 baht per month.

Variable cost of MODULAR is 200 Baht/unit. Variable cost of EXTEEM is 150 Baht/unit. Each month the manager knows demand of customers. He write down break even analysis in figure 5.1 The manager also writes down the production plan.

Each month  
If the production is less than 1,400 units, we use MODULAR.  
If the production is equal 1400 units, we can use MODULAR or EXTEEM.  
If the production is more than 1,400 units, we use EXTEEM.

Do you agree with the manager? Explain clearly and show all calculation ( if you have it)

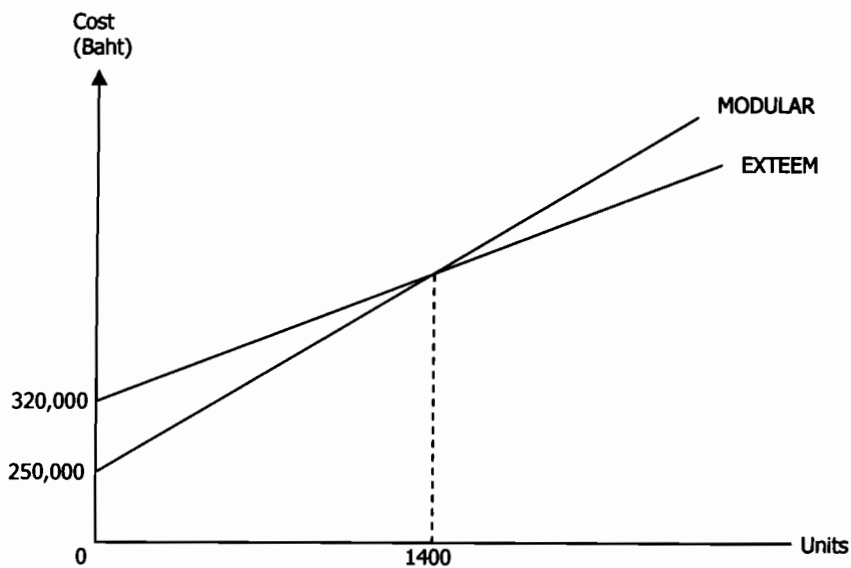


Figure 5.1 ( Not to scale )

( 10 Scores )

Name.....Surname.....Student Code.....

6. The factor has one system machine. The factory receives the orders below.

Job	1	2	3	4	5	6	7
Working time (Days)	40	28	21	16	24	39	17
Profit (Baht)	100	200	300	200	100	300	100
Priority	2	1	2	1	3	1	2
Priority 1 is maximum . Priority 3 is minimum							

6.1 How many methods do you have to rearrange the ways of working ? You must concern only working time and priority in this problem. (Show all calculation) ( 1 Score )

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6.2 Rearrange the method of working to minimize weight mean flow time ( $\bar{F}_w$ ) by using graph method.

- 6.2.1 How many weight mean flow time ( $\bar{F}_w$ ) should it be ?
- 6.2.2 How many average value of inventory in the system ( $\bar{V}$ ) should it be ?
- 6.2.3 Write down the function of  $V(t)$  at any time.
- 6.2.4 How many maximum flow time ( $F_{max}$ ) should it be ?

Use graph method for this problem. ( This problem does not concern with priority. )

( 3 Scores )



Name.....Surname.....Student Code.....

6.3 Rearrange the method of working to maximize weight mean flow time ( $\bar{F}_w$ ) with priority.

The system works 70 days and machine break down 20 days. After that it works smooth.

6.3.1 How many weight mean flow time ( $\bar{F}_w$ ) should it be ?

6.3.2 How many average value of inventory in the system ( $\bar{V}$ ) should it be ?

6.3.3 Write down the function of  $V(t)$  at any time.

6.3.4 How many maximum flow time ( $F_{max}$ ) should it be ?

You can use graph or calculation method. It depends on your decision.

( 5 Scores)

6.4 Show one example to schedule the job by using LPT (Longest Processing Time ) and explain the reason. ( 1 Score )

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

( Total 10 Scores )

