

Faculty of Engineering
Prince of Songkla University

Midterm Examination : Semester 2

Academic year 2005

Date : August 5, 2005

Time : 9.00-12.00 น.

Subject : 225-343 Production Management and Optimization Room : R300

ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในที่ทฤษฎีนั้น และ
พักการเรียน 1 ภาคการศึกษา โทษสูงสุดให้ออก

Instructions:

1. Total 6 topics, 16 pages, and 90 scores.
2. Do your examination in these papers and return all of them.
3. Write down your Name, Surname, 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.

	Scores	Your Scores
1	16	
2	9	
3	13	
4	17	
5	24	
6	11	
Total	90	

No.....

(From The number in examination list)

Name.....

Surname.....

Student code.....

Year

Department.....

Assistant Professor Yodduang Pannara

Name.....Surname.....Student code.....

1. From the topic of project management with CPM , Write down the arrow diagram from the data in topic 1.1 and 1.2 below. Draw in the free space.

1.1 (11 scores)

Activity A, B, C starts the project.

Activity A starts before activity D.

Activity B starts before activity F and E.

Activity A, C start before activity E.

Activity D starts before activity G.

Activity D, E, F start before activity H.

Activity G starts before activity J.

Activity F starts before activity I.

Activity H, I, J start before activity K.

Activity K is the final activity.

1.2 (5 scores)

Activity A, B start the project.

Activity A, B start before activity C, D, E.

Activity C, D, E start before activity F, G, H.

Activity F, G, H start before activity I.

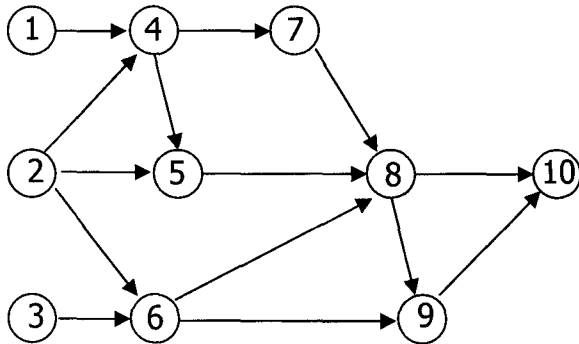
Activity I is the final activity.

(Total 16 scores)

2. CPM Network in figure 2.1, 2.2 and 2.3 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 don't write anything, your score is zero.

2.1



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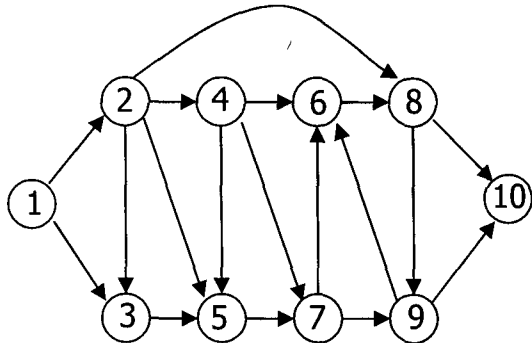
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(3 scores)

2.2



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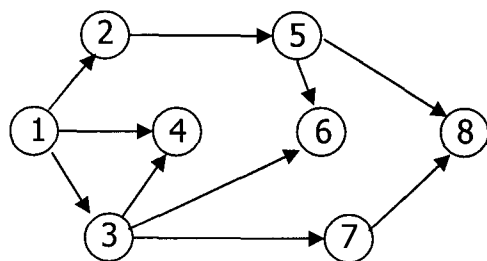
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(3 scores)

2.3



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(3 scores)

(Total 9 scores)

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 day from node (2) to node (5) is 2 days.

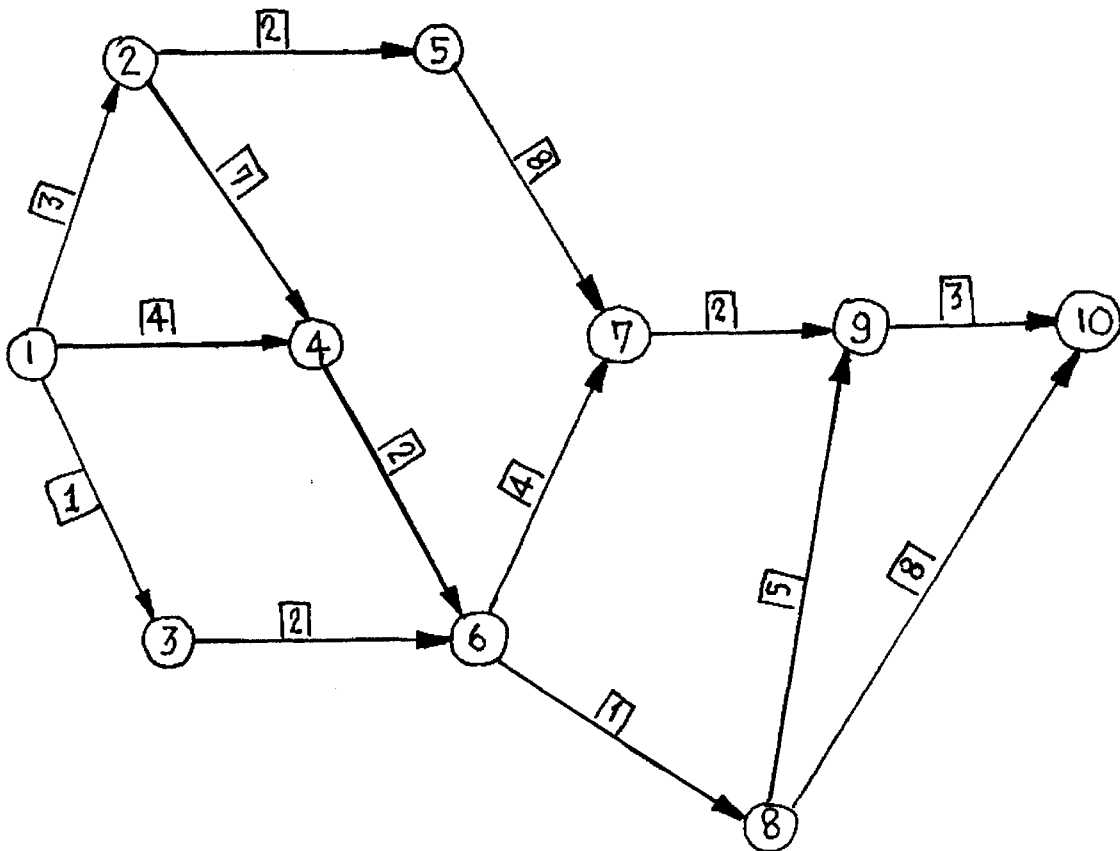


Figure 3.1

Show all calculation in figure 3.1 for

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

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3.2 What is the value of the critical path (1 score)

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Name.....Surname.....Student code.....

3.3 For every activity calculates (6 scores)

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

3.4. For every node calculates (3 scores)

- Earliest Event Occurrent Time (ES)
- Latest Event Occurrent Time (LS)

Remark : you must show the data from topic 3.3 and 3.4 in table form.

(Total 13 scores)

Name.....Surname.....Student code.....

4. Subaki factory produces 4 different models of water pump : P, Q, R and S.

There are 4 resources used for this task : labors, materials, engines, and motors.

The resources of producing the water pumps P, Q, R and S are

1. Labors are used 12, 15, 7 and 28 hours to get one water pump. The factory owns 1,000 working hours a day.
2. In each hour, subaki factory has 300 units of material. The usage of materials for the manufacturing process are 49, 30, 22 and 58 units for one water pump.
3. Engines using for the water pumps are 3, 4, 2 and 5 engines for one water pump. Subaki factory stocks 215 engines each day.
4. Motors using for the water pumps are 2, 2, 1 and 3 motors for one water pump. Subaki factory stocks 3,720 motors each month.

The profit gained from each models P, Q, R and S are 320, 480, 220 and 560 baht per unit respectively.

Subaki factory works 28 days per month and 8 hours per day. Using linear programming formulates to get the maximum profit/month. (Formulate only, do not calculate for the results.)

(17 Scores)

Name.....Surname.....Student code.....

5. Answer the following questions in this paper by giving the clearly reasons and/or explanations them as much as you can. (Each topic 2 scores)

5.1. What is the important of the priority of maintenance ? Do not set the priority more than 5 priorities.

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5.2. In the topic of linear programming, when using computer package to solve the problem, If the answer from the computer is " Infeasible Solution " , it means the user sent the big data and the computer can not solve it.

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5.3. In designing the system, the processes which are always be neglected is " feedback and system ".

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5.4. To set a proper management for maintenance, the first priority is the one concerning with the working machines. If the machines don't work properly, the factory should be closed because it cannot produce the merchandises. (Remark the first priority is the most job important)

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Name.....Surname.....Student code.....

5.5. The main problem in contract maintenance is that in the peak load time, we always found the lack of labor for contract maintenance.

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5.6. What is the meaning of each word, in term of maintenance ?

5.6.1. Turnaround time.

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5.6.2. Downtime.

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5.6.3. Peak load.

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5.6.4. Preventive maintenance.

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5.7. Normally, when we start the preventive maintenance. The total amount of non-working hours of the machine are increased. However in a long term, the total amount of non-working hours of the machine will less than before using preventive maintenance.

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5.8. For a good and efficient factory, the preventive maintenance cost should not be higher than 10 % of total maintenance cost.

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Name.....Surname.....Student code.....

5.9. From the book " Introduction to Industrial and System Engineering " , the big five engineering consisted of Civil Engineering, Mechanical Engineering, Electrical Engineering, Computer Engineering, and Industrial Engineering.

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5.10. For Industrial Engineering, what are the difference between analysis and synthesis ?

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5.11.The Faculty of Engineering, Prince of Songk la University is now using the area maintenance to maintenance the faculty.

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5.12. From the book " Introduction to Industrial and System Engineering " , there are two sets of The Journal of Industrial Engineering.

1. Monthly published " Industrial Engineering " is about the practice of the Industrial Engineering.
2. " IIE Transaction " will be published every 6 months. The journal is all about the research and newly developed methods in the field of Industrial Engineering.

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(Total 24 scores)

Name.....Surname.....Student code.....

6. A contract maintenance company has 3 teams of workers : A, B, and C.
They always work outside the company. The cost of hiring are as follows :

Team	No. of people in team	Salary per person-month	Extra pay when they work outside (Baht/team)
A	4	3,000 Baht	3,000.-
B	3	3,400 Baht	3,800.-
C	6	2,150 Baht	3,100.-

In one month period, each team can finish only one job. Thus, the company cannot get more than 3 jobs per month. The manager distributes the A, B, or C team by using methods as followed :

- The first job will be assigned to B team , because of the cheapest rate paid.
 $3 \times 3,400 \text{ Baht} + \text{extra pay } 3,800 \text{ Baht} = 14,000 \text{ Baht}.$
- The second job will be assigned to the A team , as the rate paid shown here
 $4 \times 3,000 \text{ Baht} + \text{extra pay } 3,000 \text{ Baht} = 15,000 \text{ Baht}.$
- The C team will get the last job coming in because of the highest pay rate
 $6 \times 2,150 \text{ Baht} + \text{extra pay } 3,100 \text{ Baht} = 16,000 \text{ Baht}.$

The manager analyzed the company expenses as follows : (Or you can see it in figure 6.1)
For monthly basis, if there is only one job, the most effective way to control the expenses, is to get B team to do the job. If there are 2 jobs in queue, the A team is the second team to do the job. The C team will be the last to set to solve customers' problems.
Analyze whether this plan, or method, is suitable for this company or not. Why?

Name.....Surname.....Student code.....

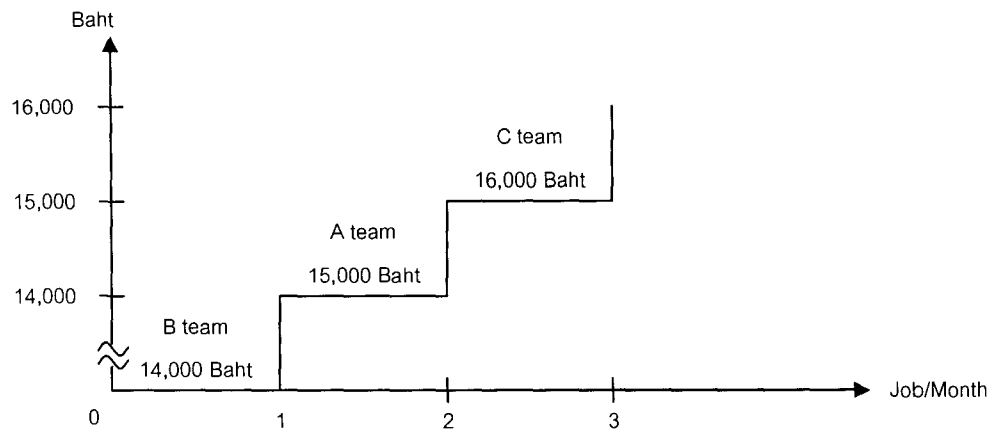


Figure 6.1 (not to scale)

(11 scores)

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