

Prince of Songkla University

Faculty of Engineering

Final Examination : Semester I

Academic Year : 2009

Date : September 28, 2009

Time : 09:00 - 12:00

Subject : 225-347 Production Planning and Control

Room : Robot

ทฤษฎีในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้น
และพักการเรียน 1 ภาคการศึกษา

PART A

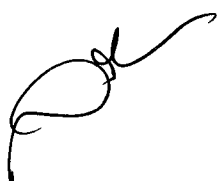
Instructions :

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

| Problem no. | Full Score | Score |
|--------------|------------|-------|
| 1 | 20 | |
| 2 | 30 | |
| 3 | 10 | |
| Total | 60 | |

Assoc. Prof. Dr. Sunchai Klinpikul

Instructor



1. It is 2.00 on Friday afternoon and Joe Bob the head chef at Bruce's Diner is trying to decide the best way to allocate the available raw material to the four Friday night specials. The decision has to be made in the early afternoon because three of the items must be started now (Sloppy Joes, Tacos and Chilli). The table below contains the information on the food in inventory and the amounts required for each item.

| Food | Cheese Burger | Sloppy Joe | Taco | Chilli | Available |
|----------------------|---------------|------------|------|--------|-----------|
| Ground beef (lbs.) | 0.3 | 0.25 | 0.25 | 0.4 | 100 lbs. |
| Cheese (lbs) | 0.1 | 0 | 0.3 | 0.2 | 50 lbs. |
| Beans (lbs) | 0 | 0 | 0.2 | 0.3 | 50 lbs. |
| Lettuce (lbs) | 0.1 | 0 | 0.2 | 0 | 15 lbs. |
| Tomato (lbs) | 0.1 | 0.3 | 0.2 | 0.2 | 50 lbs. |
| Buns (pieces) | 1 | 1 | 0 | 0 | 80 pieces |
| Taco Shells (pieces) | 0 | 0 | 1 | 0 | 80 pieces |

There is one other fact relevant to Joe Bob's decision. That is the estimated market demand and selling price.

| | Cheese Burger | Sloppy Joe | Taco | Chilli |
|----------------|---------------|------------|---------|---------|
| Minimum Demand | 75 | 60 | 100 | 55 |
| Selling price | \$ 2.25 | \$ 2.00 | \$ 1.75 | \$ 2.50 |

Joe Bob wants to maximize revenue since he has already purchased all the materials that are sitting in the cooler.

Formulate the Linear Programming model for him. (20 points)

2. Sea Shell Hotel was a medium-size hotel located in Krabi province having the following facilities :

| <u>Facilities</u> | <u>no. of rooms</u> | <u>price (฿/night)</u> |
|---------------------------------|---------------------|---|
| Air conditioned Single bed room | 150 | 1,500 |
| Air conditioned Double bed room | 200 | 1,200 |
| Bungalow (sea view) | 50 | 3,500 |
| Bungalow (lake view) | 60 | 3,200 |
| Dining Hall | 1 | - |
| Swimming Pool | 1 | 100 ฿/person (for walk-in customers) |

Suppose you were appointed to be the general manager of the hotel and you decide to develop a daily control operation system and the following data were collected on September 30, 2009 :

| <u>Facilities</u> | <u>no. of units occupied</u> |
|---------------------------------|------------------------------|
| Air conditioned Single bed room | 85 |
| Air conditioned Double bed room | 120 |
| Bungalow (sea view) | 20 |
| Bungalow (lake view) | 45 |

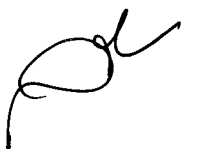
The dining hall could sell about 25,000 Baht and the swimming pool earns the revenue from 55 walk-in customers.

The cost and expenses of the operations include :

| <u>Item</u> | <u>Amount</u> | <u>Cost per unit</u> |
|-------------------------------|-----------------------------|----------------------|
| Water | 500 cu.m. | 25.00 Baht / cu.m. |
| Electricity | 13,200 kwh | 3.20 Baht / kwh |
| Detergent | 50 kgs. | 50 Baht / kg. |
| Fuel oil for boiler | 200 litres | 15.00 Baht / litres |
| Raw material for foods | 21,000 Baht | |
| LPG gas in the kitchen | 3,500 Baht | |
| Fixed Cost | 15,000 Baht / day | |
| Overhead Cost | 12,000 Baht / day | |
| Labor Cost | 32,000 Baht / day | |
| Tax | 30 % of Total profit | |

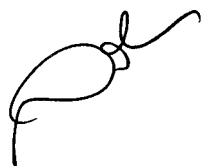
(a) Draw an information system of the daily operation control of this hotel to determine total revenue, total cost and profit after tax. (20 points)

(b) Calculate revenue cost and profit after tax of the question on Sept 30, 2009. (10 points)



3. An investment department of a real estate business is examining investing the surplus funds in a proposal for one year. Mr. Nikorn's survey yields the following four mutually exclusive proposals A to D. Funds are available to invest in anyone of the proposals. Assuming that the annual interest rate is 12%, select the most profitable proposal by using the measure of additional efficiency. (10 points)

| Proposal | A | B | C | D |
|----------------------------|-------|-------|-------|-------|
| Investment (in 1,000 Baht) | 800 | 2,000 | 2,600 | 3,100 |
| Return (in 1,000 Baht) | 1,040 | 2,480 | 3,120 | 3,690 |
| Rate of profit (%) | 30 | 24 | 20 | 19 |



PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Final Examination : Semester 1

Academic year : 2009 (2552)

Date : September 28, 2009 (28 กันยายน 2552)

Time 09:00 – 12:00

Subject : 225-347 Production Planning and Control (Part B) Room : ห้องหัวหุ่นยนต์

ทุจริตในการสอบ โทษขั้นต่ำ ปรับตกในวิชาที่ทุจริตนั้น
และพักการเรียน 1 ภาคการศึกษา

PART B

Instructions :

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, surname, student code in all the paper
4. Show all calculation and assumption.

| Problem No. | Scores | Your Scores |
|-------------|--------|-------------|
| 1 | 13 | |
| 2 | 13 | |
| 3 | 14 | |
| Total | 40 | |

Name.....

(From the number in examination)

Surname.....

Student code.....

Year/Department.....

Assistant Professor Yodduang Pannara



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

1. From the topic of project management with CPM

1.1. Write down the arrow diagram from the data below.

1.1.1.

Activity A starts before activity B and C

Activity B starts before activity D and E

Activity C starts before activity E

Activity D and E start before activity F

(3 scores)

1.1.2.

Activity A starts before activity B, C, D, E and F

Activity B, C, D, E and F start before activity G

(3 scores)

1.1.3.

Activity X starts before activity A

Activity Y starts before activity B

Activity A and B start before activity C

Activity A starts before activity D

Activity C and D start before activity Z

(3 scores)

(Total 9 scores)



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

1.2. CPM Network in figures 1.2.1 and 1.2.2 correct or not.

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

1.2.1.

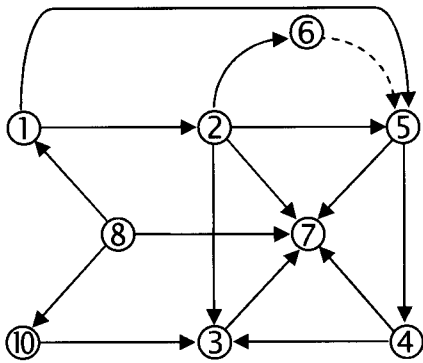


Figure 1.2.1.

(2 scores)

1.2.2.

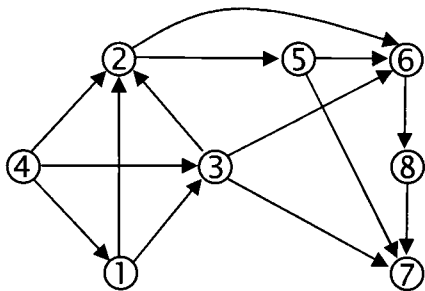


Figure 1.2.2.

(2 scores)

(Total 4 scores)

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

2. Form the topic of project management with CPM

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

For example, the working day form node ① to node ③ is 6 days

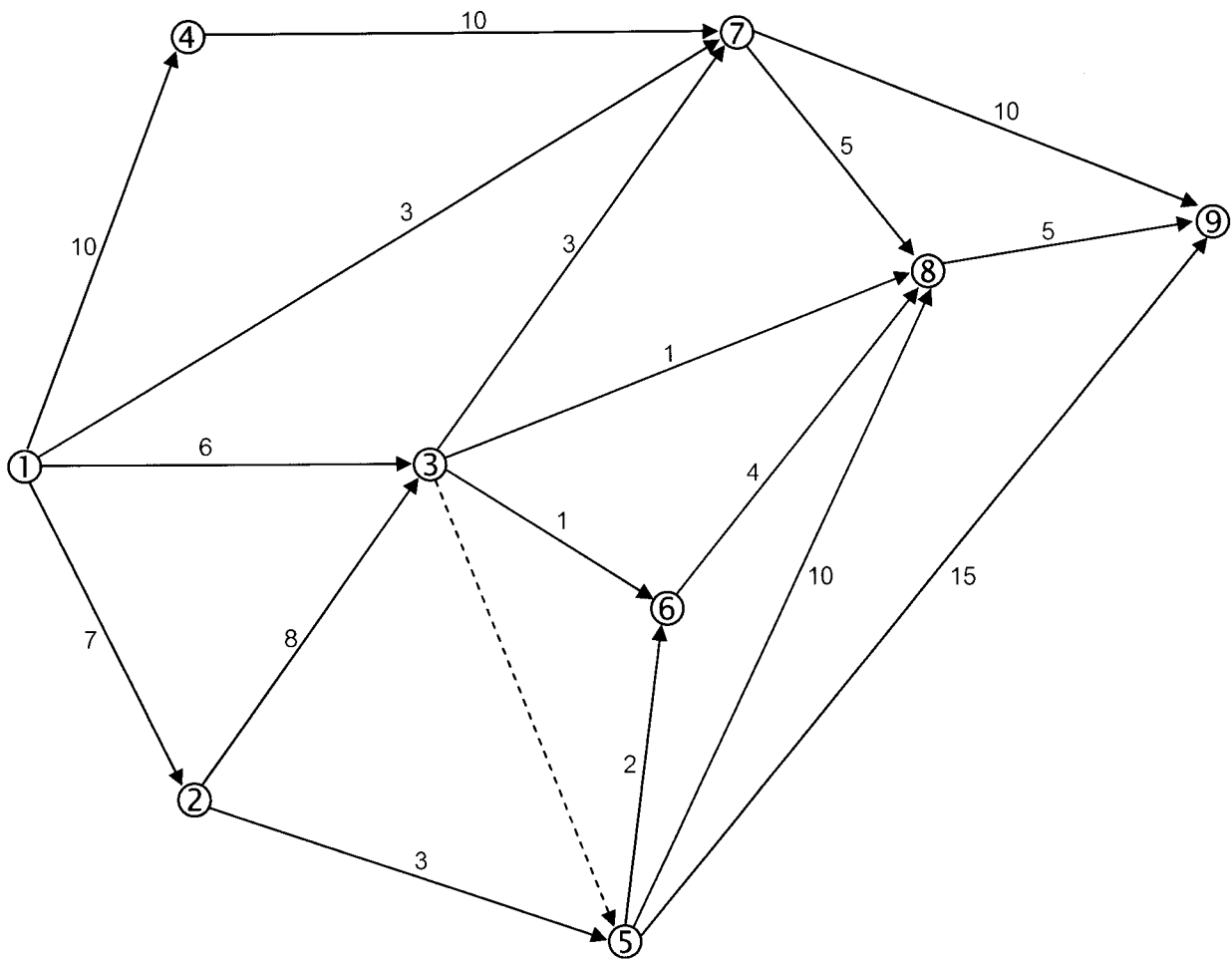


Figure 2.1

2.1. What is the meaning and benefit of critical path ? (1 scores)

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.....

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

2.2. Show all calculation in figure 2.1.

2.2.1. For every activity, calculate

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

(6 scores)

2.2.2. For every node, calculate

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

(3 scores)

2.3. Which paths are the critical paths ? Show all of them

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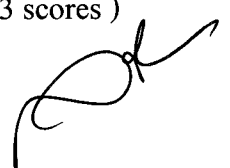
(2 scores)

2.4. What is the value of the critical path ?

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.....
.....

(1 score)

(Total 13 scores)



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

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

| JOB | A | B | C | D | E | F | G |
|---|----|----|----|----|----|----|----|
| Working time (Days) | 18 | 27 | 24 | 14 | 36 | 17 | 11 |
| Weight | 3 | 1 | 3 | 2 | 3 | 1 | 1 |
| Priority | 1 | 3 | 2 | 1 | 2 | 3 | 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 with 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 maximize weight mean flow time (\bar{F}_w) by using graph method. In this problem, the machine works for 35 days and breaks down 12 days. After that the technician can fix it and it works very good until the project is finished. How many days should the project be? How many average value of inventory in the system (\bar{V}) should it be? Use graph method for this problem. (This problem does not concern with priority) (6 scores)

3.3. Rearrange the method of working to minimize weight mean flow time (\bar{F}_w) with priority. How many days should the project be? How many average value of inventory in the system (\bar{V}) should it be ? (You can use graph or calculation method. It depends on your decision) (6 scores)

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

(Total 14 scores)

