Student Name:..

PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Final Examination : Semester 1

Date: October 4, 2009

Subject: 225-348 Operations Research

Academic Year: 2009

Time: 09:00-12:00

Room: หัวปุนยนต์

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ทุจริตในการสอบ โทษขั้นต่ำปรับตกในรายวิชานั้นและ
พักการเรียน 1 ภาคการศึกษา

Part A

Instructions:

1. There are 3 questions, 60 points (30%).

2. Books and notes are allowed.

3. A calculator and a dictionary are allowed.

4. Borrowing things from other students is prohibited.

5. Writing by pencil is allowed

Question No.	Full Score	Score
1	15	
2	25	
3	20	
Total	60	

Runchana Sinthavalai, Ph.D

Instructor

1. *(15 Points)* Player A and B simultaneously call out one of the numbers one, two or three. Player A wins if the multiplied product of the numbers is even. Player B wins if the multiplied product of the numbers is odd. The amount paid to the winner by the loser is the multiplied product of the numbers in Baht. Find the optimum value of the game by using the approaches of Minimax (for Player A) and Maximin (for Player B).

2. **(25 Points)** A large retailer is planning to open a new store. Two locations are currently under consideration: A and B. Transportation costs for the locations, demands and supplies for existing factories and stores are shown below. Each of the locations has a demand potential of 300 units per week. Which location would provide the lowest transportation costs for the system?

Table I: Transportation costs per unit to new locations

Factory	To Location A	To Location B
1	$4	$7
2	$11	$6
3	$5	$5

Table II: Transportation costs per unit, demands and supplies

	XXX	YYY	Supply (Units/ week)
1	15	9	660
2	10	7	340
3	14	18	200
Demand (Units/ week)	400	500	

Using Vogal Approximation Method to Identify the IBFS and any methods to complete the optimal solution.

3. *(20 Points)* A firm has two products: A and B. Both items require three operations: cutting, gluing, and finishing. The manager of the firm has collected the following data on these products:

Item	Profit/ unit	Time per unit (minutes)		
		Cutting	Gluing	Finishing
A	$2	1.4	5	1.2
B	$6	0.8	13	3

The manager wants to use available time at the end of each week to make goods for stock. He has also determined that, during each week, 56 minutes are available for cutting, 650 minutes are available for gluing, and 360 minutes are available for finishing. Answer both questions:

3.1 What quantities of A and B will maximize profits? Use Simplex Method to solve the problem.

3.2 From your solution in Question 3.1, which operations are not completely used and how much of each operation is unused?

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FACULTY OF ENGINEERING

PRINCE OF SONGKLA UNIVERSITY

Final Examination : Semester

Date : October 4, 2009 (4 ตุลาคม 2552)

Subject : 225-348 Operations Research (Part B)

Academic year : 2009 (2552)

Time 09:00 – 12:00

Room : ห้องหัวหุ่นยนต์

PART B

1. Total Examination has 2 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 and student code in every page.

4. All books, notes, and calculators are allowed, but you are not permitted to borrow anything from the others.

5. Show all calculation and assumption.

Problem No.	Scores	Your Score
1	20	
2	20	
Total	40	

Number...

(From the number in examination)

Name..

Last name...

Student code...

Year/Department.......................................

Assistant Professor Yodduang Pannara

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

1.   PSU Auto Service is considering the construction of three repair facilities, each with different characteristics. The probability distribution of buses breakdowns each month follows the Poisson distribution, that is,

$$P\{A = n\} = \frac{e^{-30}(30)^n}{n!}, \qquad n = 0, 1, \ldots.$$

The loss of revenue (opportunity cost) to the firm of having a bus in repair is estimated to be 10,000 Baht per month. The three facilities under consideration have the following characteristics (We ignore interest rates and returns on investment) :

Characteristics	Facility A	Facility B	Facility C
Installation cost (Baht)	1,000,000	1,800,000	1,200,000
Labor cost per month (Baht)	50,000	70,000	30,0000
Mean repair rates (Buses/Month)	40	70	25
Service distribution	Exponential	Constant	Erlang
Economic life (Years)	7	7	5

Which facility should be built ?

(20 scores)

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

2. Thai Boiler company must make quarterly purchasing decisions for a boiler. Data for the 3 month purchasing and storage problem is as follows :

Month	Demand (Units)	Cost per boiler at beginning of month (Baht)	Storage cost for inventory per boiler (Baht)
January	1	560,000	40,000
February	1	600,000	38,000
March	3	620,000	37,000

At the beginning of each month Thai Boiler company must purchase enough compressors to satisfy demand. Excess purchases are carried over as inventory for the next month. The company has one unit on hand January, 1 and the cost of this boiler is 520,000 Baht. Thai Boiler company wants no inventory after March.

Use only Dynamic Programming to make the good decision to optimize the total cost. You must show the method and total cost.

(20 scores)