



STAMFORD COLLEGE
SCHOOL OF COMPUTER SCIENCES
DIPLOMA IN INFORMATION TECHNOLOGY

SEC201: OPERATIONAL RESEARCH

Date : 31 October 2006 (Tuesday)

Time : 9.00 a.m. – 11.00 a.m.

Duration: 2 hours

Instructions to Candidates

Answer ALL questions.

Please ensure that this examination paper contains FOUR questions on FOUR printed pages before you start the examination.

Books, papers and other written materials are not allowed to be brought into the examination hall. A candidate who violates the examination rules of Stamford College or commits a malpractice will be disqualified from the examination.

Candidates may use calculators provided the calculators give no printout, have no work display facilities, are silent and cordless.

Write your Examination Index Number on each page of your answer booklet.

ANSWER ALL QUESTIONS.

Answer **ALL** Questions.

The total marks allocated for each of the questions are shown in brackets.

Question 1

A company produces two types of leather belts A and B. Belt A is superior in quality and belt B is inferior. Profits on the two are 40 and 30 cents per belt respectively. Each belt of type A requires 2 hours of skilled labour and B type requires 1 hour of skilled labour. Each day, only 1000 hours of skilled labour are available. But supply of leather is sufficient only for 800 belts per day. Belt A requires a fancy buckle and only 400 of them are available per day. For belt B only 700 buckles are available per day.

- (a) Formulate a linear programming model to determine the number of belt of the two types the company should manufacture in order to gain maximum overall profit.
- (b) Determine the optimal solution graphically.
- (c) If the profit from the belt of Type A increases to 50 cents, what would be the overall change in total profit of the company per day.
- (d) The company has decided to employ 12 more employees that will cost RM400 per day but it will increase labour supply by 200 hours. State whether the company's decision on increasing the number of employees is wise.

(Total = 25 marks)

Question 2

Solve the following linear programming model using the Simplex method.

Maximise = $20x + 16y$

Sub to

$$5x + 2y \leq 3000$$

$$x + 3y \leq 1750$$

$$3x + 2y \leq 2100$$

$$x \geq 0, y \geq 0$$

(Total = 25 marks)

Question 3

The following table shows a list of project activities along with their preceding activities and expected completion time in weeks.

Activities	Preceding Activities	Optimistic	Pessimistic	Most likely
A	-	6	12	9
B	-	4	8	7
C	A	14	20	17
D	A	7	13	10
E	A	3	9	5
F	C	13	28	25
G	D	10	16	14
H	D	12	18	15
I	B,E	9	12	11
J	I,G	17	25	20

- Draw the project network.
- Determine the earliest and latest starting and completion times of activities.
- What is the probability that the project will be completed two weeks earlier than expected.

(Total = 25 marks)

Question 4

- (a) Obtain an initial feasible basic feasible solution by using **Vogel's Approximation method.**

(12.5 marks)

	M1	M2	M3	M4	Supply
F1	4	6	8	13	500
F2	13	11	10	8	700
F3	14	4	10	13	300
F4	9	11	13	3	500
D _{emand}	250	350	1050	200	

Question 4 (continued)

(b) Given below is a transportation problem worksheet. Obtain a basic feasible solution

using **North West Corner Rule.**

Origin	D1	D2	D3	supply
O1	2	7	4	5
O2	3	3	1	8
O3	5	4	7	7
O4	1	6	2	4
demand	7	9	18	

(12.5
marks)

(Total=25marks)

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