Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014

COURSE NAME	:	MATHEMATICS FOR MANAGEMENT
COURSE CODE	:	BPA12203/BWM10803
PROGRAMME	:	1 BPA / 1 BPB / 1 BPC
EXAMINATION DATE	:	DECEMBER 2013/JANUARY 2014
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) An augmented matrix is given as follows:

$$\left[\begin{array}{ccc|ccc} 2 & 3 & -1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 & 1 & 0 \\ 0 & 2 & -1 & 0 & 0 & 1 \end{array}\right]$$

Do the appropriate row operations on the augmented matrix above and state the inverse of the matrix.

(12 marks)

(b) David owns a restaurant in Batu Pahat Mall. To begin the business, he wants to order 200 dinner sets with two types of design. The first design (x) costs RM20 per set and the second design (y) costs RM15 per set. He has a budget of RM3 200 with which to buy the dinner sets.

Calculate the number of each type of dinner sets he should buy such that the budget is used and 200 dinner sets are acquired.

(8 marks)

Q2 (a) A linear programming model is given below.

Minimize $C = 10x + 30y$
subject to

$$2x + y \leq 160$$
$$x + 3y \geq 120$$
$$x, y \geq 0$$

Apply the graphical approach to determine feasible region, corner points and optimal solution.

(12 marks)

(b) An electrical retail store has a sale on microwaves and stoves. To unpack and set up, each microwave requires 2 hours, and each stove requires 1 hour. The storeroom space is limited to 50 items. The budget of the store allows only 80 hours of employee time for unpacking and setting up. Microwaves sell for RM300 each, and stoves sell for RM200 each.

Let m represent the number of microwaves and s represent the number of stoves. Formulate a linear program model so that the store can maximize revenue.

(8 marks)

Q3 (a) Evaluate the derivatives of the following functions at $x = 1$.

(i) $f(x) = (x^2 - 3x + 1)^5$.

(5 marks)

(ii) $g(x) = \ln(2x + 1)$.

(3 marks)

(b) The cost to manufacture x unit of portable pagers is

$$C(x) = 10\ 000 + 3x + \frac{x^2}{10\ 000}.$$

The production level is currently at $x = 5\ 000$ units and it is increasing by 100 units per day.

Determine the changing of the average cost per day.

(12 marks)

Q4 (a) A chair company produces two models of chairs. The model A takes 3 worker-hours to assemble and 2 worker-hours to paint. The model B takes 2 worker-hours to assemble and 1 worker-hour to paint. The maximum number of worker-hours available to assemble chairs is 240 per day, and the maximum number of worker-hours to paint chairs is 80 per day.

Let x represent the number of model A produced in a day and y represent the number of model B produced in a day. Write a system of linear inequalities to describe the situation.

(8 marks)

(b) The initial simplex table for a linear program model is shown in **Table Q4** (a), where x_1 and x_2 are decision variables, s_1 and s_2 are slack variables, and P is the profit function.

Table Q4 (a): Initial simplex table

	x_1	x_2	s_1	s_2	P	rhs
s_1	2	1	1	0	0	8
s_2	2	3	0	1	0	12
P	-3	-1	0	0	1	0

Complete the procedure of the Simplex method in order to obtain the optimal solution.

(12 marks)

Q5 (a) The derivative of a logarithm function $\ln f(x)$ is given by

$$\frac{d}{dx}[\ln f(x)] = \frac{f'(x)}{f(x)}.$$

Show that

$$\int \frac{x-1}{x^2+x}\,dx = \frac{1}{2}\left[\ln(x^2+x) - 3\ln(x) + 3\ln(x+1)\right] + c$$

where c is a constant and

$$\int \frac{1}{x^2+x}\,dx = \ln(x) - \ln(x+1).$$

(8 marks)

(b) Take $u = 2x^3 + x^6 - 5$, solve the following integral.

$$\int \frac{x^2+x^5}{\sqrt{2x^3+x^6-5}}\,dx.$$

(12 marks)

- END OF QUESTION -