UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	MATHEMATICS FOR REAL ESTATE MANAGEMENT
COURSE CODE	:	BPE 15002
PROGRAMME CODE	:	BPD
EXAMINATION DATE	:	DECEMBER 2016 / JANUARY 2017
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **THREE (3)** PAGES

Q1. Let $\mathbf{a} = (3, -4, -1)$ and $\mathbf{b} = (0, 5, 2)$.

Calculate:

(a) $7\mathbf{a} - 3\mathbf{b}$

(2 marks)

(b)   Distance $\mathbf{a}$ and $\mathbf{b}$

(2 marks)

(c)   Magnitude of $\mathbf{b}$

(2 marks)

(d)   Unit vector of $\mathbf{a}$

(4 marks)

(e) $\mathbf{a} \cdot \mathbf{b}$ (verify whether the vectors are orthogonal)

(5 marks)

(f)   Angle between $\mathbf{a}$ and $\mathbf{b}$ (write in radians)

(5 marks)

(g) $\mathbf{a} \times \mathbf{b}$ (verify whether the vectors are parallel)

TERBUKA (5 marks)

Q2   (a)   Let

$$A = \begin{bmatrix} 3 & -3 \\ 2 & 1 \\ 4 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 4 & -3 & 2 \\ -2 & 2 & 3 \end{bmatrix} \quad C = \begin{bmatrix} 4 & -5 \\ -2 & 1 \end{bmatrix}$$

Compute:

(i) $\mathbf{BA} - 3\mathbf{C}$

(4 marks)

(ii) $\mathbf{A^T} + \mathbf{B}$

(4 marks)

(iii) $\mathbf{B^T C^T}$

(5 marks)

(b)   Solve the matrix equation by using Gauss elimination method.

$$\begin{bmatrix} 2 & -2 & 1 \\ 3 & 1 & -1 \\ 1 & -3 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \\ 0 \end{bmatrix}$$

(12 marks)

Q3   A psychologist uses two types of boxes with mice and rats. The amount of time (in minutes) that each mouse and each rat spends in each box per day is given in the **Table Q3**.

Table Q3: The amount of time (in minutes) spent by each mouse and each rats

	Mice (minutes)	Rats (minutes)	Max. time available per day (minutes)
Box A	10	20	800
Box B	20	10	640

Find the maximum number of mice and rats that can be used in this experiment.

(a)   State the objective function and constraints.

(4 marks)

(b)   Sketch a graph to illustrate the feasible region.

(8 marks)

(c)   Determine the corner points of the feasible region.

(7 marks)

(d)   Compute the maximum value.

(6 marks)

Q4   Find the maximum value of $P = 4x + 2y + 3z$

Subject to
$$x + y + z \leq 11$$
$$2x + 3y + z \leq 20$$
$$x + 3y + 2z \leq 20$$

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

(a)   Construct the initial simplex tableau.

(6 marks)

(b)   Solve the **Q4 (a)** to obtain the final tableau.

(19 marks)

-END OF QUESTIONS-