UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2010/2011

COURSE NAME	:	ALGEBRA
COURSE CODE	:	DAD 10103
PROGRAMME	:	NA - PERSEDIAAN DIPLOMA
EXAMINATION DATE	:	APRIL/MAY 2011
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **ALL** QUESTIONS IN **PART A** AND **THREE (3)** QUESTIONS IN **PART B**

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

PART A

Q1 a) Given that $\mathbf{d} = 2i - j + 3k$, $\mathbf{e} = -3i + 2j - 4k$ and $\mathbf{f} = 2i + j$. Find the angle between $\mathbf{d}$ and $(\mathbf{e} \times \mathbf{f})$.

(8 marks)

b) Find the parametric equation of a line that passes through A $(1, 2, -3)$ and B $(2, 3, -2)$.

(5 marks)

c) Find the equation of a plane containing A $(2, 4, 1 - 3)$, B $(-3, 1, -2)$ and C $(4, -1, 0)$.

(7 marks)

Q2 a) Find the inverse of matrix A, if $A = \begin{pmatrix} 1 & 1 & 3 \\ 2 & 3 & 9 \\ 2 & 1 & 2 \end{pmatrix}$.

(12marks)

b) Use inversion in (a) to solve the following system for x, y and z.

$$\begin{aligned} x + y + 3z &= 6 \\ 2x + 3y + 9z &= 19 \\ 2x + y + 2z &= 3 \end{aligned}$$

(8 marks)

PART B

Q3 a) Given $\dfrac{9^x}{81^y} = 27$ and $8^y . 16^{(x+1)} = \dfrac{1}{2}$. Find the value of x and y.

(6 marks)

b) Without using calculator, solve x if $3\log(x - 3) = \log 10 + 2\log(x - 3) - \log x$

(6 marks)

c) Given $x = \dfrac{\sqrt{3}+2}{\sqrt{3}-2}$. By rationalizing the denominator, find

i) x

ii) $\dfrac{1}{x}$

iii) $x - \dfrac{1}{x}$

(8 marks)

Q4 a) Solve $4(x^2 - x) = x^2 - 1$.

(6 marks)

b) Solve the inequality $\dfrac{(x-3)(2x+1)}{x} \geq 0$ by showing the sign analysis.

(6 marks)

c) Express $\dfrac{x^2 + 2x + 3}{(x-2)(2x^2 + 3)}$ as a partial fraction.

(8 marks)

Q5 a) Ali has RM840 in his bank account in February. Starting from March, he deposits RM204 monthly in his bank account. Find his bank account balance at the end of November in the same year.

(10 marks)

b) Calculate the sum of the first 9 terms of the geometric progression $12, 8, \dfrac{16}{3}, \ldots$

(10 marks)

Q6 a) Verify the following identity: $\dfrac{1-\tan^4 x}{\sec^2 x} = 1 - \tan^2 x.$

(7 marks)

b) Solve the following equations for $0° \leq x \leq 360°$

i) $\tan x = -\tan 23°$
ii) $\cos x = \sin 32°$

(8 marks)

c)

Given that $2\sin^2 x + 5\sin x - 3 = 0$. Find $\cos x$ for $-\dfrac{\pi}{2} \leq x \leq \dfrac{\pi}{2}.$

(7 marks)

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SEMESTER / SESSION PERSEDIAAN DIPLOMA	: SEM II / 2010/2011	PROGRAMME : NA -
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Formulae

Arithmetic Sequences

(i) $u_n = a + (n-1)d$

(ii) $d = u_n - u_{n-1}$

(iii) $S_n = \dfrac{n}{2}(a + u_n)$

(iv) $S_n = \dfrac{n}{2}\left[2a + (n-1)d\right]$

Geometric Sequences

(i) $u_n = ar^{n-1}$

(ii) $r = \dfrac{u_n}{u_{n-1}}$

(iii) $S_n = \dfrac{a(1-r^n)}{1-r}$ **if** $r < 1$

(iv) $S_n = \dfrac{a(r^n - 1)}{r-1}$ **if** $r > 1$

(v) $S_\infty = \dfrac{a}{1-r}$

Trigonometry

(i) $\sin^2 x + \cos^2 x = 1$

(ii) $\tan^2 x + 1 = \sec^2 x$

(iii) $1 + \cot^2 x = \csc^2 x$

Vector

$$\text{distance} = \left| \frac{Ax_0 + By_0 + Cz_0 - D}{\sqrt{A^2 + B^2 + C^2}} \right|$$