CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

FINAL EXAMINATION

JANUARY 2010 SESSION

SUBJECT CODE	:	WQD 10102
SUBJECT TITLE	:	TECHNICAL MATHEMATICS I
LEVEL	:	DIPLOMA
TIME / DURATION	:	9.00 am – 11.00 am (2 HOURS)
DATE	:	26 APRIL 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of THREE (3) parts. Part A, B and C. Answer all questions in Part A and B. For Part C, answer two (2) questions only.
6. Answer all questions in English.
7. Formula Sheet is appended.

THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

PART A (Total: 15 marks)

MULTIPLE CHOICE QUESTIONS

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

1. Given $5x + 2(x - 2) = 10$. Find x.

   A. 3

   B. 2

   C. -7

   D. $\frac{6}{7}$

2. Find the x - intercept of the straight line $2y = -5x + 80$

   A. 4

   B. -8

   C. 8

   D. 16

3. Determine the slope of the line B which is parallel to a straight line A that has equation of $2y + 3x = 10$.

   A. 2

   B. $-\frac{3}{2}$

   C. $\frac{2}{3}$

   D. 5

4. Given $A = \begin{bmatrix} 2 & -3 \\ 0 & -4 \end{bmatrix}$. $A^T =$

A. $\begin{bmatrix} 0 & -4 \\ 2 & -3 \end{bmatrix}$

B. $\begin{bmatrix} -2 & 3 \\ 0 & 4 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 0 \\ -3 & -4 \end{bmatrix}$

D. $\begin{bmatrix} -4 & 0 \\ -3 & 2 \end{bmatrix}$

5. The determinant of matrix $B = \begin{bmatrix} \frac{1}{2} & -2 \\ 6 & 0 \end{bmatrix}$

A. 12

B. -12

C. 6

D. -6

6. Simplify $\left(q^{1/2}\right)^2 \div q^{1/3}$

A. $q^{1/6}$

B. $q^{1/12}$

C. $q^{1/3}$

D. $q^{2/3}$

7. Given $\log_4 x = 3$. Find x.

A. 12

B. 64

C. 32

D. -12

8. $\frac{10}{3x^3}$ can be written as

A. $\frac{10}{3}x^{-3}$

B. $30x^{-3}$

C. $\frac{10}{3}x^{3}$

D. None of the above

9. Solve possible value for t given $\cos t = 0.3685$

A. $t = 21.62°, 338.38°$

B. $t = 68.38°, 111.62°$

C. $t = 21.62°, 291.62°$

D. $t = 68.38°, 291.62°$

10. Find the reference angle for $\theta = \frac{\pi}{4}$.

A. 45^0

B. 90^0

C. -45^0

D. 42^0

11. In Figure 1, given $A = 64^0$, $C = 47^0$ and $a = 17$cm. Find AB.

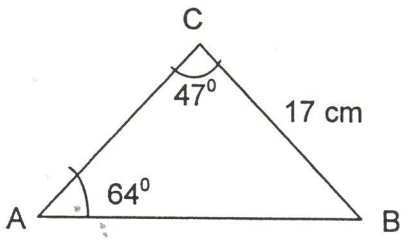

Figure 1

A. 13.8 cm

B. 12.8 cm

C. 13 cm

D. 14.8 cm

12. Find the area of the circle with a diameter of 6 cm. ($\pi = 3.14$)

A. 28.26 cm^2

B. 18.84 cm^2

C. 38.26 cm^2

D. 113.04 cm^2

13. If $\sin\theta = 0.6105$ and $\cos\theta = 0.3685$, $\cot\theta$ is.

A. 0.6036

B. 0.6306

C. 0.7036

D. 0.6360

14. Determine the type of roots for $4x^2 + 12x + 9 = 0$.

A. There is no real solution.

B. There is one real solution.

C. There are two real solutions

D. There are two imaginary solutions

15. Determine the degree of the given polynomial $x^3 - 2x^2 - 5x + 6$.

A. 1

B. 2

C. 3

D. 4

PART B (Total: 35 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Simplify the following: $\dfrac{4\left(-3a^2b^5\right)^2}{2\left(ab^3\right)^3}$

[3 marks]

Question 2

Figure 2 below, *ABC* is a right-angled triangle, if *AB* is 6 cm and $\sin\theta = \dfrac{3}{5}$, determine the length of *BC*.

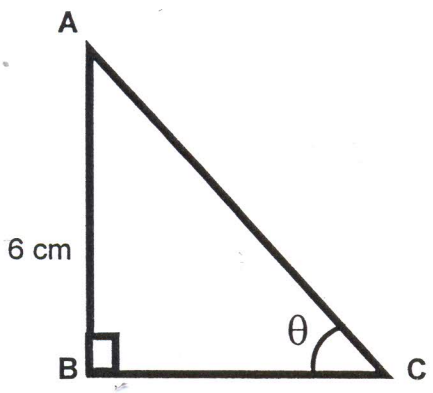

Figure 2

[4 marks]

Question 3

By using a substitution method, find the value of m and n that satisfy the following simultaneous linear equations.

$$2m - 3n = 13$$
$$4m + n = 5$$

[5 marks]

Question 4

If $A=\begin{bmatrix}2 & 5\\ 1 & 3\end{bmatrix}$ and $B=\begin{bmatrix}-2 & 4\\ 2 & -6\end{bmatrix}$. Determine the following:

a) $3A-\frac{1}{2}B$

b) B^TA

[5 marks]

Question 5

Sketch the graph of $y=-(x+1)^2+4$ and determine whether the vertex is a minimum or maximum point.

[6 marks]

Question 6

Show that $(x-2)$ is a factor of $P(x)=2x^3+7x^2-10x-24$. Then, factorize $P(x)$ completely by using the synthetic division.

[6 marks]

Question 7

A ladder leans against the side of a building with its foot 7.5 meter away from the building and makes an angle of 70^0 with the ground as shown in Figure 3 below. Leave the answer correct to 3 decimal places, determine:

a) the length of the ladder, PQ

b) the area of the triangle PQR

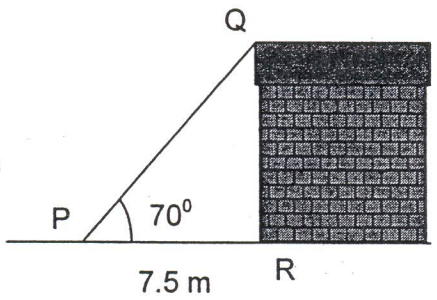

Figure 3

[6 marks]

PART C (Total: 30 marks)

INSTRUCTION: Answer TWO questions.

Please use the answer booklet provided.

Question 1

Solve the following equations by using the Cramer's rule.

$$x + y = 2$$
$$2x - z = 1$$
$$2y - 3z = -1$$

[15 marks]

Question 2

Sketch the graph of 2 cycle of trigonometric function $y = \sin x$ for $-360^o \leq x \leq 360^o$. Then, determine

a) the y-intercept of $y = \sin x$,

b) the range of x when the graph of $y = \sin x$ is increasing,

c) the amplitude of $y = \sin x$,

d) the values of x when $\sin x = 0$, and

e) the values of x when $\sin x = 1$.

[15 marks]

Question 3

a) Solve the following equations by using a quadratic formula.

(i) $3x^2 + 19x = 14$

(ii) $1.1t^2 + 1 = -1.2t$

correct to 3 decimal places.

b) When polynomial $P(x) = 2x^3 + px^2 + qx + 2$ divided by $(x - 2)$, the remainder is 12. Given that $(x - 1)$ is one of the factors. Evaluate the value of p and q, thus solve $P(x) = 0$.

[15 marks]

END OF QUESTION

FORMULA SHEET

TRIGONOMETRY IDENTITIES

FUNDAMENTAL IDENTITIES	FORMULAS FOR NEGATIVES
$\csc\theta = \frac{1}{\sin\theta}$	$\sin(-\theta) = -\sin\theta$
$\sec\theta = \frac{1}{\cos\theta}$	$\cos(-\theta) = \cos\theta$
$\cot\theta = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}$	$\tan(-\theta) = -\tan\theta$
$\tan\theta = \frac{\sin\theta}{\cos\theta}$	$\csc(-\theta) = -\csc\theta$
$\sin^2\theta + \cos^2\theta = 1$	$\sec(-\theta) = \sec\theta$
$1 + \tan^2\theta = \sec^2\theta$	$\cot(-\theta) = -\cot\theta$
$1 + \cot^2\theta = \csc^2\theta$	

ADDITION FORMULAS	SUBTRACTION FORMULAS
$\sin(A+B) = \sin A\cos B + \cos A\sin B$	$\sin(A-B) = \sin A\cos B - \cos A\sin B$
$\cos(A+B) = \cos A\cos B - \sin A\sin B$	$\cos(A-B) = \cos A\cos B + \sin A\sin B$
$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A\tan B}$	$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A\tan B}$

HALF-ANGLE FORMULAS	DOUBLE-ANGLE FORMULAS
$\sin\frac{\theta}{2} = \pm\sqrt{\frac{1-\cos\theta}{2}}$	$\sin 2\theta = 2\sin\theta\cos\theta$
$\cos\frac{\theta}{2} = \pm\sqrt{\frac{1+\cos\theta}{2}}$	$\cos 2\theta = \cos^2\theta - \sin^2\theta$ $\ldots\ldots = 1 - 2\sin^2\theta$ $\ldots\ldots = 2\cos^2\theta - 1$
$\tan\frac{\theta}{2} = \frac{1-\cos\theta}{\sin\theta} = \frac{\sin\theta}{1+\cos\theta}$	$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$

PRODUCT-TO-SUM FORMULAS	SUM-TO-PRODUCT FORMULAS
$\sin\alpha\cos\beta = \frac{1}{2}[\sin(\alpha+\beta)+\sin(\alpha-\beta)]$	$\sin\alpha+\sin\beta = 2\sin\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}$
$\cos\alpha\sin\beta = \frac{1}{2}[\sin(\alpha+\beta)-\sin(\alpha-\beta)]$	$\sin\alpha-\sin\beta = 2\cos\frac{\alpha+\beta}{2}\sin\frac{\alpha-\beta}{2}$
$\cos\alpha\cos\beta = \frac{1}{2}[\cos(\alpha+\beta)+\cos(\alpha-\beta)]$	$\cos\alpha+\cos\beta = 2\cos\frac{\alpha+\beta}{2}\cos\frac{\alpha-\beta}{2}$
$\sin\alpha\sin\beta = \frac{1}{2}[\cos(\alpha-\beta)-\cos(\alpha+\beta)]$	$\cos\alpha-\cos\beta = -2\sin\frac{\alpha+\beta}{2}\sin\frac{\alpha-\beta}{2}$