



UNIVERSITI KUALA LUMPUR

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FINAL EXAMINATION  
JANUARY 2011 SESSION

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SUBJECT CODE : WQD 10102  
SUBJECT TITLE : TECHNICAL MATHEMATICS I  
LEVEL : DIPLOMA  
TIME / DURATION : 2.00 pm – 4.30 pm  
( 2.5 HOURS )  
DATE : 03 MAY 2011

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INSTRUCTIONS TO CANDIDATES

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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.
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THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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## PART A (Total: 15 marks)

## MULTIPLE CHOICE QUESTIONS

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

1. Without using calculator, determine the value of  $\log_x 1$ .
  - A. 1
  - B. 0
  - C. 2
  - D.  $x$
  
2. Determine the value of  $16^{\frac{1}{4}} \times 25^{\frac{1}{2}} \div 4^{-2}$ .
  - A. 10
  - B. 16
  - C. 160
  - D.  $\frac{5}{8}$
  
3. Express  $2\log_7 2x + \log_7 x$  as a single logarithm.
  - A.  $\log_7 4x^3$
  - B.  $\log_7 2x^3$
  - C.  $\log_7 2x^2$
  - D.  $\log_7 4x$
  
4. If  $-2x + 6 = 4x - 2$ , determine the value of  $x$ .
  - A. 0
  - B. 3
  - C.  $\frac{1}{2}$
  - D.  $\frac{4}{3}$

5. If  $cd = 3d + e - ad$ , express  $d$  in term of  $a, c$  and  $e$ .

A.  $d = \frac{e}{c-3+a}$

B.  $d = \frac{e}{c-3-a}$

C.  $d = \frac{a}{c+3-e}$

D.  $d = \frac{a}{c-3+e}$

6. If  $\frac{-(3x-1)}{3} = \frac{x+8}{5}$ , then  $x$  is equal to:

A.  $\frac{19}{18}$

B.  $-\frac{19}{18}$

C.  $\frac{12}{21}$

D.  $-\frac{12}{21}$

7. Determine the factors of  $2x^2 + x - 21 = 0$ .

A.  $(2x-7)(x+3)$

B.  $(x+7)(2x-3)$

C.  $(x-7)(2x+3)$

D.  $(2x+7)(x-3)$

8. Solve  $x^2 - 3x = 0$ .

A. 3

B. 0 and -3

C. 0 and 3

D. -3

9.  $3 \begin{bmatrix} -3 & 2 \\ 4 & -1 \end{bmatrix} - \begin{bmatrix} 5 & -2 \\ 4 & -6 \end{bmatrix} =$

A.  $\begin{bmatrix} -8 & 4 \\ 0 & 10 \end{bmatrix}$

B.  $\begin{bmatrix} 5 & 7 \\ 3 & 10 \end{bmatrix}$

C.  $\begin{bmatrix} 8 & -9 \\ 12 & -3 \end{bmatrix}$

D.  $\begin{bmatrix} -14 & 8 \\ 8 & 3 \end{bmatrix}$

10. Let  $f(x) = 3x^3 + 5x + 13$  and  $g(x) = 3x^3 + 5x + 1$ , determine  $g(x) - f(x)$ .

A. -6

B. -12

C. 12

D. 4

11. Identify the hypotenuse, adjacent side and opposite side in the following Figure 1 for angle  $y$ .

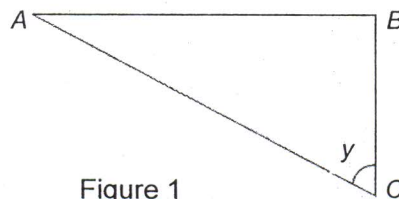


Figure 1

- A.  $AB =$  Adjacent side,  $BC =$  Opposite side and  $AC =$  Hypotenuse side.
- B.  $AB =$  Opposite side,  $BC =$  Hypotenuse side and  $AC =$  Adjacent side.
- C.  $AB =$  Adjacent side,  $BC =$  Hypotenuse side and  $AC =$  Opposite side.
- D.  $AB =$  Opposite side,  $BC =$  Adjacent side and  $AC =$  Hypotenuse side.

12. Determine the possible angle between the range of  $0^\circ < \theta < 360^\circ$  for this trigonometry equation,  $\cos \theta = -0.6428$ .
- A.  $\theta = 50^\circ, 310^\circ$
  - B.  $\theta = 50^\circ, 130^\circ$
  - C.  $\theta = 130^\circ, 310^\circ$
  - D.  $\theta = 130^\circ, 230^\circ$
13. Write the equation  $z = \sqrt{-12} + \sqrt{4}$  in complex number form.
- A.  $-12 + 2i$
  - B.  $2 - 2\sqrt{3}i$
  - C.  $2 + 2\sqrt{3}i$
  - D.  $-12i + 2$
14. The expression  $(3 - 7i)^2$  is equivalent to
- A.  $-40 + 0i$
  - B.  $-40 - 42i$
  - C.  $58 + 0i$
  - D.  $58 + 42i$
15. Given  $z = -2 + 8i^3$ , determine the complex conjugate of  $z$ .
- A.  $\bar{z} = -2 + 8i$
  - B.  $\bar{z} = 2 + 8i$
  - C.  $\bar{z} = -2 - 8i$
  - D.  $\bar{z} = 2 - 8i$

**PART B (Total: 45 marks)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

Solve  $5^{2x-1} = 12^x$ .

[4 marks]

**Question 2**

Solve the following equations:

a)  $4(s+1) = 3(2s-1)$

b)  $\frac{3}{t-2} = \frac{4}{3t+4}$

[5 marks]

**Question 3**

Solve  $\frac{x+2}{4} + \frac{3}{x-1} = 7$  using quadratic formula

[5 marks]

**Question 4**a) Show that  $(x+2)$  is a factor of  $f(x) = 6x^3 + 13x^2 - 4$ . Hence, factorize  $f(x)$  completely.b) Given  $P(x) = 2x^3 + 4x^2 - x + 3$  and  $Q(x) = 3x^2 + x - 1$  determine

i.  $P(-2)$

ii.  $P(x)Q(x)$

[10 marks]

## Question 5

Given  $A = \begin{bmatrix} -1 & 4 \\ 6 & -5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 4 & -3 \\ 2 & -1 \end{bmatrix}$  and  $C = \begin{bmatrix} 1 & 2 \\ 0 & -3 \end{bmatrix}$ .

- a) Determine  $2A - B$ .  
 b) Verify that  $(AC)^T = C^T A^T$ .

[10 marks]

## Question 6

A boy was playing two kites; each with the length of string is different. The kites string make an angle  $60^\circ$  and  $35^\circ$ . If the high of the both kites from the boy is 45 m, how far apart are the kites ( $x$ )?

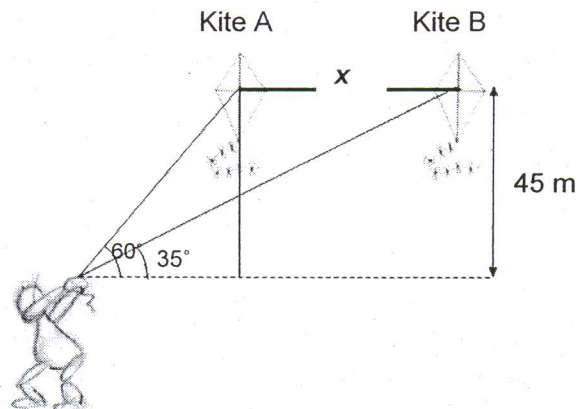


Figure 1

[5 marks]

## Question 7

Given  $A = 5 - 7i$  and  $B = -3 + 5i$ . Determine :

- a)  $\overline{A - B}$   
 b)  $AB$

[6 marks]

**PART C (Total: 40 marks)****INSTRUCTION: Answer TWO questions.****Please use the answer booklet provided.****Question 1**

Given the system of equations:

$$x + y + z = 2$$

$$x - 3y + 2z = -5$$

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

- Write the system into matrix form.
- Solve the system by using Cramer's rule.

[20 marks]

**Question 2**

- The quadratic equation  $x^2 + 4x + 13 = p(2 - x)$  has real and equal roots. Calculate the values of  $p$ .
- Given that  $(x - 2)$  is a factor of  $f(x)$ , where  $f(x) = ax^3 - 10x^2 + bx - 2$ , and when  $f(x)$  is divided by  $(x - 3)$ , its remainder is 16. Determine the values of  $a$  and  $b$ .

[20 marks]

**Question 3**

If  $Z_1 = 7 + 2i$  and  $Z_2 = 1 - 7i$ , what is the total impedance  $Z$  if these are connected in parallel where  $Z = \frac{Z_1 Z_2}{Z_1 + Z_2}$ . Express the impedance in polar and exponential form.

[20 marks]

**END OF QUESTION**