

**UNIVERSITI KUALA LUMPUR**

**FINAL EXAMINATION
JULY 2010 SESSION**

SUBJECT CODE : WQD10102
SUBJECT TITLE : TECHNICAL MATHEMATICS I
LEVEL : DIPLOMA
TIME / DURATION : 9.00 am – 11.30 am
(2 HOURS and 30 MINUTES)
DATE : 8 NOVEMBER 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 not appended.
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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. Evaluate $7 \log 4.5$, correct to 3 decimal places.
 - A. 3.150
 - B. 31.500
 - C. 4.572
 - D. 457.2

2. Without using a calculator, determine the value of $2^{\log_2 5}$.
 - A. 5
 - B. 2
 - C. 1
 - D. 0

3. Simplify $\frac{6m^4n^3}{4m^{-3}n^{-3}}$.
 - A. $\frac{6}{4}mn$
 - B. $\frac{3}{2}m^7n^6$
 - C. $\frac{3}{2}m$
 - D. $\frac{3}{2}m^7$

4. The width of a rectangle is 5 cm more than its length. Determine the dimension, if the area is 104 cm^2 .
 - A. Width = 8, length = 13
 - B. Width = 5, length = 8
 - C. Width = 8, length = 5
 - D. Width = 13, length = 8

5. If $\frac{p}{4} + p = 2$, then p is equal to:
- A. $\frac{8}{5}$
 - B. $\frac{8}{3}$
 - C. 4
 - D. -4
6. If $a + 3(a - 2) = 6$, determine the value of a .
- A. 0
 - B. 4
 - C. 2
 - D. 3
7. $2 \begin{bmatrix} 3 & -4 \\ 4 & 1 \end{bmatrix} + \begin{bmatrix} 2 & -1 \\ 4 & -5 \end{bmatrix} =$
- A. $\begin{bmatrix} 8 & 9 \\ 5 & 3 \end{bmatrix}$
 - B. $\begin{bmatrix} -8 & -7 \\ -9 & 3 \end{bmatrix}$
 - C. $\begin{bmatrix} 8 & -9 \\ 12 & -3 \end{bmatrix}$
 - D. $\begin{bmatrix} 8 & -7 \\ 12 & -3 \end{bmatrix}$
8. Determine the type of roots of $x^2 + 3x - 5 = 0$.
- A. Two real and equal roots
 - B. Two real and distinct roots
 - C. Complex roots
 - D. No solution

9. What are the factors of $12x^2 - 10x + 2$?
- A. $(4x - 2)(3x + 1)$
 - B. $(4x - 1)(3x - 2)$
 - C. $(4x + 1)(3x - 2)$
 - D. $(3x - 1)(4x - 2)$
10. Let $P(x) = 4x^2 - 3x + 2$, $Q(x) = -4x + 6$, determine $P(x) - Q(x)$.
- A. $4x^2 + x + 12$
 - B. $4x^2 + x - 4$
 - C. $4x^2 - 7x + 8$
 - D. $4x^2 + 7x - 4$
11. Given that $\sin \theta = 0.7672$ and $\cos \theta = -0.5072$, then $\cot \theta$ is equal to:
- A. -0.6611
 - B. -1.5126
 - C. 1.5126
 - D. 0.6611
12. The angles between 0° and 360° whose $\cos \theta = -0.895$ are:
- A. $\theta = 26.49^\circ, 153.51^\circ$
 - B. $\theta = 116.49^\circ, 243.51^\circ$
 - C. $\theta = 153.51^\circ, 206.49^\circ$
 - D. $\theta = 63.51^\circ, 116.49^\circ$
13. Calculate $(7 + 9i) - (6 - 4i)$.
- A. $13 + 5i$
 - B. $1 + 13i$
 - C. $1 + 5i$
 - D. $13 - i$

14.

$$Z^n = r^n (\cos n\theta + i \sin \theta) \quad Z^n = r^n e^{in\theta} \quad Z^n = r^n \angle n\theta$$

The given Theorem is:

- A. Binomial Theorem
 - B. Pythagoras Theorem
 - C. De Moivre's Theorem
 - D. Chain Rule Theorem
15. Given that $Z = -2.8 + 3.12i$. Determine the value of θ .
- A. 131.91°
 - B. 48.09°
 - C. 236.31°
 - D. 123.69°

PART B (Total: 45 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

Given that $\log_2 3 = 1.585$ and $\log_2 5 = 2.322$, without using calculator, evaluate $\log_2 75$.

[4 marks]

Question 2

Solve the following equations:

a) $2(k - 1) = 7(k - 1)$

b) $\frac{(2u - 1)}{3} - \frac{(3u - 1)}{4} = 1$

[5 marks]

Question 3

Solve $2q^2 + 2q - 19 = 0$ by using the quadratic formula, giving the answer in 2 decimal places.

[5 marks]

Question 4

Given $A = \begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix}$ and $C = \begin{bmatrix} 1 & 0 \\ -2 & 1 \end{bmatrix}$. Determine:

a) $A - 2B$.

b) Verify that $(AC)^T = C^T A^T$.

[10 marks]

Question 5

- a) Determine the remainder, when $P(x) = x^3 - 4x^2 + 2x + 5$ is divided by $x - 3$.
- b) Determine the quotient and the remainder when $x^4 - 3x^2 + 10x - 5$ is divided by $x + 3$.

[10 marks]

Question 6

A ladder leans against the side of a building with its foot 6.5 meter away from the building and makes an angle of 65° with the ground. Giving answer correct to 2 decimal places, determine:

- a) the length of the ladder
- b) the area of the triangle ABC

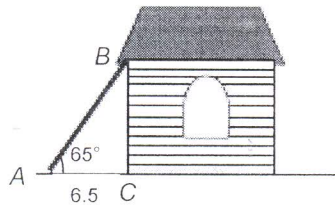


Figure 3

[5 marks]

Question 7

Given $z = 5 + 6j$ and $w = 3 - 2j$. Determine:

- a) $\overline{z + w}$
- b) $z \cdot w$

[6 marks]

PART C (Total: 40 marks)

INSTRUCTION: Answer TWO questions.
Please use the answer booklet provided.

Question 1

Given the system of equations:

$$\begin{aligned}x + y + z &= 4 \\2x - y + 2z &= 5 \\x - 2y - z &= -3\end{aligned}$$

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

[20 marks]

Question 2

- a) Use the method of elimination to solve the system of equations:

$$\begin{aligned}10x - 4y &= 50 \\5x + y &= 100\end{aligned}$$

- b) Determine the values of p and q if $(x - 1)$ and $(x - 2)$ are both factors of $f(x) = x^3 + px^2 + qx - 6$. Then, factorize completely.

[20 marks]

Question 3

- a) Given $Z = -2 + 5i$.
- Draw the Argand diagram of Z .
 - Determine the modulus and the argument of Z .
 - Express the trigonometric form of Z .

- b) If $Z_1 = 1 + 3i$ and $Z_2 = 5 - 6i$, compute $\frac{Z_1 \cdot Z_2}{Z_1 + Z_2}$.

[20 marks]

END OF QUESTION