



UNIVERSITI KUALA LUMPUR

**FINAL EXAMINATION
SEPTEMBER 2013 SEMESTER**

SUBJECT CODE : WQD10103
SUBJECT TITLE : TECHNICAL MATHEMATICS 1
LEVEL : DIPLOMA
TIME / DURATION : 9.00 am – 11.30 am
(2 ½ HOURS)
DATE : 30 DECEMBER 2013

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.
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THERE ARE 8 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. Without using calculator, determine the value of $\log_3 9$.
 - A. $\frac{1}{2}$
 - B. 3
 - C. 1
 - D. 2

2. Determine the value of $25^{\frac{3}{2}} \times 125^{\frac{1}{3}}$.
 - A. 625
 - B. 326
 - C. 5
 - D. 125

3. Express $4\log t - 3\log t^2 + \log t^3$ as a single logarithm.
 - A. $\log t$
 - B. $-\log t$
 - C. $\log t^2$
 - D. $-\log t^2$

4. If $2m = -4m + 5$, determine the value of m .
 - A. $-\frac{5}{6}$
 - B. $-\frac{6}{5}$
 - C. $\frac{5}{6}$

- D. $\frac{6}{5}$
5. If $p(3+q) = 7q+2$, express q in term of p .
- A. $q = \frac{-p}{p-7}$
- B. $q = \frac{2-3p}{p-7}$
- C. $q = \frac{2-3p}{p+7}$
- D. $q = \frac{2+3p}{p-7}$
6. If $\frac{k-2}{5} = \frac{4-2k}{3}$, then k is equal to:
- A. -2
- B. $-\frac{1}{2}$
- C. $\frac{1}{2}$
- D. 2
7. Determine the factors of $3m^2 - 4m - 4 = 0$.
- A. $(3m+2)(m-2)$
- B. $(3m-2)(m+2)$
- C. $(3m+2)(m+2)$
- D. $(3m-2)(m-2)$
8. Solve $p^2 - 121 = 0$.
- A. 11
- B. 0 and 11
- C. 11 and -11
- D. -11

9. If $2\begin{bmatrix} a & 3 \\ 4 & -2 \end{bmatrix} - \begin{bmatrix} 3 & 2 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 7 & 4 \\ 7 & -4 \end{bmatrix}$, determine the value of a .

- A. 5
- B. -5
- C. 2
- D. -2

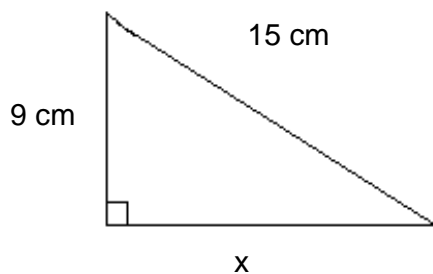
10 Let $f(x) = x^2 + 4$ and $g(x) = 2x - 3$, determine $f(x)g(x)$.

- A. $2x^3 + 3x^2 - 8x + 12$
- B. $2x^3 - 3x^2 + 8x - 12$
- C. $-2x^3 - 3x^2 + 8x - 12$
- D. $-2x^3 + 3x^2 + 8x + 12$

11 Determine i^{20} .

- A. 1
- B. -1
- C. $\sqrt{-1}$
- D. 0

12 Calculate the length of the unknown side.



- A. $x = 12$

- B. $x = 17.4929$
- C. $x = 24$
- D. $x = 11.6190$

13

Determine the diameter of a circle with a circumference of 500ft.

- A. 79.6ft
- B. 159.2ft
- C. 12.6ft
- D. 25.2ft

14

If $M = -2 + 5i$ and $N = 4 + 3i$, determine MN .

- A. $7 + 14i$
- B. $-7 + 14i$
- C. $-23 - 14i$
- D. $-23 + 14i$

15

Given $z = -27 + 38i$, determine the complex conjugate of z .

- A. $\bar{z} = -27 + 38i$
- B. $\bar{z} = -27 - 38i$
- C. $\bar{z} = 27 + 38i$
- D. $\bar{z} = 27 - 38i$

PART B(Total: 45 marks)

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

Question 1

Solve $16^{3m+2} = 64^{m-3}$.

[4 marks]

Question 2

Solve the following equations:

a) $5(b - 4) = 2(3b + 9)$

[2 marks]

b) $\frac{3x+2}{3} = \frac{-2x-1}{2}$

[3 marks]

Question 3

Solve $2x^2 - 3(x+5) = -7x$ by using a quadratic formula.

[5 marks]

Question 4

a) Given that $(x-2)$ is a factor of $f(x) = 2x^3 - 3x^2 - 8x + 12$. Factorize $f(x)$ completely.

[5 marks]

b) Given $P(x) = 3x^2 - 4x$, $Q(x) = 2x - 6$ and $R(x) = P(x)Q(x)$ determine

i. $R(x)$

[3marks]

ii. $R(-3)$

[2marks]

Question 5

Given $P = \begin{bmatrix} -5 & 3 \\ 7 & -2 \end{bmatrix}$, $Q = \begin{bmatrix} -1 & 0 \\ 2 & -3 \end{bmatrix}$ and $R = \begin{bmatrix} 4 & -2 \\ 2 & 3 \end{bmatrix}$. Determine:

a) $3P + 2Q$.

[3marks]

b) $2QR$

[3marks]

c) $(QR^T)^T$

[4marks]

Question 6

An airplane suspended in the air at a height of 500ft, lies directly over a line from soldier Field to the Planetarium (see the figure). If the angle of depression from the airplane to the stadium is 32° and from the airplane to the planetarium is 23° , determine the distance between Soldier field and the Planetarium.



Soldier Field

Planetarium

[5

marks]

Question 7

Given $Z_1 = 4 + 7i$ and $Z_2 = -3 - 9i$. Determine :

a) $Z_1 Z_2$

[3 marks]

b) $\overline{Z_2 - Z_1}$

[3 marks]

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

Given the system of equations:

$$\begin{aligned}3p + 2q - r &= 14 \\ -p + q + 3r &= -5 \\ 2p - 3q + 2r &= -9\end{aligned}$$

a) Write the system into matrix form.

[2 marks]

b) Solve the system by using Cramer's rule.

[18 marks]

Question 2

a) Solve the following system of equations using Elimination Method.

$$\begin{aligned}9x + 6y &= -60 \\ -4x - 5y &= 15\end{aligned}$$

[8 marks]

b) Given that $(x + 3)$ and $(2x - 1)$ are a factor of $f(x)$, where $f(x) = ax^3 + 20x^2 + 19x - d$.

Determine the values of a and d .

[12 marks]

Question 3

If $Z_1 = 1 + 3j$ and $Z_2 = -3 + 6j$, determine the total impedance Z where $Z = \frac{Z_2 - Z_1}{Z_1 Z_2}$

. Express the impedance Z in polar and exponential form.

[20 marks]

END OF QUESTION