



UNIVERSITI KUALA LUMPUR
Malaysian Institute of Marine Engineering Technology

FINAL EXAMINATION
FEBRUARY 2025 SEMESTER SESSION

SUBJECT CODE	: LMD13602
SUBJECT TITLE	: TECHNICAL MATHEMATICS 1
PROGRAMME NAME (FOR MPU: PROGRAMME LEVEL)	: DIPLOMA OF ENGINEERING TECHNOLOGY IN MARINE ENGINEERING
TIME / DURATION	: 09.00 AM - 11.30 AM (2 HOURS 30 MINUTES)
DATE	: 3 JULY 2025

INSTRUCTIONS TO CANDIDATES

1. Please read **CAREFULLY** the instructions given in the question paper.
 2. This question paper has information printed on both sides of the paper.
 3. This question paper consists of **TWO (2)** sections; Section A and Section B.
 4. Answer **ALL** question in Section A, and **TWO (2)** questions **ONLY** in Section B.
 5. Please write your answers on this answer booklet provided.
 6. Answer **ALL** questions in English language **ONLY**.
 7. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 8. Formulae sheet has been appended for your reference.
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THERE ARE 6 PAGES OF QUESTIONS, INCLUDING THIS PAGE.

SECTION A: 60 marks**INSTRUCTION: Answer ALL questions.****Question 1****With reference to Positive and Negative Integers, Ratios, Fraction and Decimals;****(a) Show which of the following is true proportion:**

i. $\frac{5}{7} = \frac{35}{49}$

(2 marks)

ii. $\frac{13}{15} = \frac{52}{60}$

(2 marks)

iii. $\frac{6}{7} = \frac{35}{42}$

(2 marks)**(b) Solve the following proportion:**

- i. Two numbers are respectively 30% and 70% more than a third number. Find the ratio of the two numbers.

(4 marks)

- ii. Salaries of Ali and Abu as engineer are in the ratio 2 : 3. If the salary of each is increased by RM 8000, the new ratio become 40 : 57. Determine the Ali's salary.

(6 marks)

(c) Show the **manual calculation of $92.67 \div 2.5 \times 6.1$ and round the answer to two significant figures.**

(4 marks)

Question 2**With reference to Algebraic;**

(a) Write the phrase as algebraic expression:

- i. Take away x from z and the answer is six. (1 mark)
- ii. Seven less than three times a number is the same as zero. (1 mark)
- iii. The product of two and the square of a number, then decreased by four. (1 mark)
- iv. When eight is added to two times a number and the answer is 14. (1 mark)
- v. The sum of nine and x , divided by four is equal to three times y . (1 mark)

(b) Given the following equations, rewrite k as a subject.

- i. $\frac{8k}{2m} = k - 1$. (3 marks)
- ii. $2m = (\sqrt{3k^2 + 4} - 9n)^2$. (4 marks)

(c) Sketch the graph of parabola $f(x) = x^2 - 6x + 5$ using graph paper.

(8 marks)

Question 3**With reference Simultaneous Equation and Polynomial;**

- (a) Solve the following simultaneous equation by using substitution method:

$$x - 2y = 6$$

$$8x - 4y = 3$$

(7 marks)

- (b) Determine the root of x for $x^2 - 6x + 5 = 0$ using quadratic formula.

(7 marks)

- (c) Factorize $f(x) = x^3 - 7x - 6$ as far as possible.

(6 marks)

SECTION B: 60 marks**INSTRUCTION: Answer TWO (2) QUESTIONS only****Question 4****With reference to Matrices;**

Given the following system of equation:

$$x - 2y - 5z = 6$$

$$2x - y + 4z = 3$$

$$5x + 3y + z = 1$$

- (a) Change the system into the matrix form.

(6 marks)

- (b) Calculate the determinant of D, D_x, D_y and D_z.

(8 marks)

- (c) Find the value of x, y and z.

(6 marks)

Question 5**With reference to Complex Number;**

- (a) In an electrical circuit design, the current flows is represented by the expression $3a - (5b)j = (5 - 3j)(8 + 2j) - (2 - j)$ where $\boxed{a}$ and $\boxed{b}$ are parameters of an electronic components. Determine the values of $\boxed{a}$ and $\boxed{b}$.

(10 marks)

- (b) Compute the following complex number operations and leave the answer in polar form.

$$5(\cos 40^\circ + i \sin 40^\circ) + (3 - 4i) - 7 \angle 25^\circ$$

(10 marks)

Question 6**With reference Matrices and Complex Number;**

- (a) The stress measurements (in MPa) at three different points A, B, and C on two different structural components at two different times are represented by the following matrices:

$$A = \begin{bmatrix} 3 & 4 \\ 2 & 7 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 6 \\ 1 & 5 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 3 \\ 1 & 2 \end{bmatrix}$$

Calculate:

- i. $(A + B) + (B - C)$.
(3 marks)
- ii. Determinant A and B.
(3 marks)
- iii. $2B - C^2$.
(4 marks)

- (b) In an electronic communication system, the system includes a network of resistances connected in series, denoted by $W = 2 - 8i$ and $Z = -5 - i$.

- i. Plot W and Z in Argand Diagram.
(3 marks)
- ii. Determine the conjugation of Y is given $Y = \frac{WZ}{3-4j}$.
(7 marks)

END OF EXAMINATION PAPER

FORMULA SHEET

ALGEBRA

QUADRATIC FORMULA	
$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	

TRIGONOMETRY

LAW OF SINE	LAW OF COSINE
$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	$a^2 = b^2 + c^2 - 2bc\cos A$

COMPLEX NUMBER

POWER OF i
$i = \sqrt{-1}$ $i^2 = -1$ $i^3 = -i$ $i^4 = 1$
ALGEBRAIC FORM
$Z = a + bi$
TRIGONOMETRIC FORM
$Z = r(\cos \theta + i \sin \theta)$
POLAR FORM
$Z = r \angle \theta$
EXPONENTIAL FORM
$Z = re^{i\theta}$

DE MOIVRE
TRIGONOMETRIC FORM
$z^n = [r(\cos \theta + i \sin \theta)]^n = r^n (\cos n\theta + i \sin n\theta).$
$\sqrt[n]{W} = W_o = \sqrt[n]{r} \left(\cos \frac{\theta^\circ}{n} + i \sin \frac{\theta^\circ}{n} \right)$ $\sqrt[n]{W} = W_1 = \sqrt[n]{r} \left(\cos \frac{\theta^\circ + 360^\circ}{n} + i \sin \frac{\theta^\circ + 360^\circ}{n} \right)$
POLAR FORM
$Z^n = [r \angle \theta]^n = r^n \angle n\theta$
$\sqrt[n]{W} = W_o = \sqrt[n]{r} \angle \frac{\theta^\circ}{n}$ $\sqrt[n]{W} = W_1 = \sqrt[n]{r} \angle \frac{\theta^\circ + 360^\circ}{n}$
EXPONENTIAL FORM
$Z^n = [re^{i\theta}]^n = r^n e^{in\theta}$
$\sqrt[n]{W} = W_o = \sqrt[n]{r} \angle e^{i\theta/n}$ $\sqrt[n]{W} = W_1 = \sqrt[n]{r} \angle e^{i\frac{\theta+360^\circ}{n}}$