الجامعة الوطنية
National University
Science & Technology للعلوم والتكنولوجيا
كلية عمان البحرية الدولية
International Maritime College Oman

ACADEMIC YEAR 2023 - 2024

Program	Semester	Term	Paper
FOUNDATION	2	2	MAIN 1

MODULE NAME:	**APPLIED MATHEMATICS**		
MODULE CODE:	**FMTH006**	**EXAM DATE:**	**22/07/2024**
INSTRUCTOR's NAME:	**Muhammad Kazam**	**DURATION:**	**2 hrs.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page)**:** **10**

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers must be written **in English**.
- Write all the answers **in blue or black pen only**.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Cheating / copying is not allowed and will result in failing the exam.

		FINAL MARKS
STUDENT NAME:		
STUDENT ID:		
CLASS:		**40**

Number of answer scripts:……..…….. **Invigilator:**……..……..…..

Student's signature: …… **Time of receipt:**……..…..

Question 1 [10 Marks]

Circle the correct option to fill in the blanks.

Example. 85 is a _____ digit number.			
a 1	**b** 2	**c** 3	**d** 4
1. The net change in the value of the function $f(x) = 5x - 4$ between the inputs -1 to 2 is _____.			
a. -23	**b.** 23	**c.** -5	**d.** 5
2. The point _____ is a solution of the inequality $3x + 2y \leq 2$.			
a. $(1, 3)$	**b.** $(-2, 1)$	**c.** $(3, -1)$	**d.** $(0, 5)$
3. The class mark for the group $(1 - 9)$ is _____.			
a. 1	**b.** 5	**c.** 9	**d.** 10
4. If a coin is tossed 3 times, then the number of elements in the sample space is _____.			
a. 1	**b.** 2	**c.** 4	**d.** 8
5. $f(x) = 2e^x$ is a _____ function.			
a. linear	**b.** quadratic	**c.** logarithmic	**d.** exponential
6. If two lines intersect each other, then the system has _____ solution(s).			
a. no	**b.** one	**c.** two	**d.** infinitely many
7. The exponential form of $\ln x = 2$ is _____.			
a. $x^2 = 1$	**b.** $2^x = 1$	**c.** $e^2 = x$	**d.** $e^x = 2$
8. $\ln(\frac{x}{2y}) =$ _____.			
a. $\ln x - \ln 2 + \ln y$	**b.** $\ln x + \ln 2 - \ln y$	**c.** $\ln x + \ln 2 + \ln y$	**d.** $\ln x - \ln 2 - \ln y$
9. $f(x) = ax^2 + bx + c$ has a minimum value if _____.			
a. $a < 0$	**b.** $a > 0$	**c.** $a = 0$	**d.** $a \neq 0$
10. The range of the data 45, 32, 37, 46, 39, 36, 41, 48, 36 is _____.			
a. 16	**b.** 39	**c.** 46	**d.** 48

Question 2 [4 Marks]

A prime number is a number that is evenly divisible only by 1 and itself. The prime numbers less than 50 are listed below.

2 3 5 7 11 13 17 19 23 29 31 37 41 43 47

Choose one of these numbers at random.

a. Calculate the probability that the number is odd. **(1 mark)**

b. Calculate the probability that the number is less than 10. **(1 mark)**

c. Calculate the probability that the sum of the digits is even. **(2 marks)**

Question 3 [4 Marks]

Calculate the mean and median of the data given below.

42 38 39 45 47 41 44 41 37 42

Question 4 [2 Marks]

Use the laws of Logarithms to expand the expression given below.

$$\log_4\left(\frac{s^5}{7t^2}\right)$$

Question 5 [4 Marks]

Solve the equation given below.

$$2e^{12x} = 17$$

Question 6 [3 Marks]

Calculate the inverse of the function given below.

$$f(x) = \frac{1}{x+2}$$

Question 7 [5 Marks]

Solve the following system of equations.

$$3x + 5y = 20$$

$$7x + 4y = -7$$

Question 8 [8 Marks]

A quadratic function f is given below.

$$f(x) = x^2 - 2x + 3$$

a. Calculate the axis of symmetry and vertex of f. **(3 marks)**

b. Sketch a graph of f. **(5 marks)**

Formula Sheet

$(A+B)(A-B)=A^2-B^2$	$(A+B)^2=A^2+2AB+B^2$
$(A-B)^2=A^2-2AB+B^2$	$(A+B)^3=A^3+3A^2B+3AB^2+B^3$
$(A-B)^3=A^3-3A^2B+3AB^2-B^3$	$A^3+B^3=(A+B)(A^2-AB+B^2)$
$A^3-B^3=(A-B)(A^2+AB+B^2)$	
Quadratic formula	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$
Standard deviation	$s=\sqrt{\frac{1}{n-1}\left[\sum X^2-\frac{(\sum X)^2}{n}\right]}$

Reference:

Stewart, J., Redlin, L. and Watson, S. (2017) *Precalculus Mathematics for Calculus*. 7th edn. Cengage.