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	1	2	MAIN

MODULE NAME:	**BASIC MATHEMATICS II**		
MODULE CODE:	**FMTH004**	**EXAM DATE:**	**04/02/2024**
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.

STUDENT NAME:	
STUDENT ID:	
CLASS:	

FINAL MARKS	
	40
	10

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
i. If $b^2 - 4ac < 0$, then the equation has _____ real solutions.			
a no	**b** 1	**c** 2	**d** many
ii. The solution of the inequality $2x - 5 > 3$ is _____.			
a $[-4, 4]$	**b** $(-4, 4)$	**c** $(4, \infty)$	**d** $(-\infty, 4)$
iii. The midpoint of the line segment joining two points $A(1, -3)$ and $B(-3,5)$ is _____.			
a $(2, 5)$	**b** $(2, -1)$	**c** $(-2, -1)$	**d** $(-1, 1)$
iv. If two sides of a triangle are equal, it is called a/an _____ triangle.			
a equilateral	**b** right	**c** isosceles	**d** scalene
v. The y- intercept of the equation $x^2 - y^2 = 1$ is _____.			
a -1	**b** 1	**c** ± 1	**d** no y- intercept
vi. The slope of vertical line is _____.			
a 0	**b** 1	**c** -1	**d** undefined
vii. $90° =$ _____ radian			
a $\frac{\pi}{6}$	**b** $\frac{\pi}{3}$	**c** $\frac{\pi}{2}$	**d** $\frac{3\pi}{5}$
viii. If $\sec\theta < 0$ and $\sin\theta > 0$, then θ lies in the _____ quadrant.			
a I	**b** II	**c** III	**d** IV
ix. The decimal degree form of the angle $24°30'$ is _____.			
a 24.05°	**b** 24.25°	**c** 24.5°	**d** 24.75°
x. The reference angle for the angle $240°$ is _____.			
a $30°$	**b** $-45°$	**c** $60°$	**d** $-60°$

Question 2 [3 Marks]

Find the area of a sector with central angle $120°$ in a circle of radius $6\ cm$.

Question 3 [4.5 Marks]

If $\cos\theta = \frac{15}{17}$, then calculate the following trigonometric ratios.

a. $\sin\theta$ **b.** $\cot\theta$ **c.** $\csc\theta$

Question 4 [5 Marks]

Solve the inequality given below. Also express the solution using interval notation and graph the solution set.

$$3x^2 - 8x + 4 \geq 0$$

Question 5 [6 Marks]

Show that the points $A(-1,2), B(7,5), C(2,-6)$ are vertices of a right triangle by using the converse of the Pythagorean Theorem.

Question 6 [5 Marks]

Solve the following equation.

$$\sqrt{3-3x}-1=2x$$

Question 7 [3 Marks]

Test the equation for symmetry.

$$x^2 + 2xy + 3y^2 = 12$$

Question 8 [3.5 Marks]

You stand 45 meters from the base of the tree. The angle of elevation from the ground to the top of the tree is 60°. Calculate the height of the tree.

Formula Sheet

Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Distance formulas: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Algebraic Formulas

$(A+B)(A-B) = A^2 - B^2$	$(A+B)^2 = A^2 + 2AB + B^2$
$(A-B)^2 = A^2 - 2AB + B^2$	$(A+B)^3 = A^3 + 3A^2B + 3AB^2 + B^3$
$(A-B)^3 = A^3 - 3A^2B + 3AB^2 - B^3$	$A^3 + B^3 = (A+B)(A^2 - AB + B^2)$
$A^3 - B^3 = (A-B)(A^2 + AB + B^2)$	

Trigonometric Table

$\theta°$	$\sin\theta$	$\cos\theta$	$\tan\theta$
0	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2} = 0.87$	$\frac{\sqrt{3}}{3} = 0.58$
45°	$\frac{\sqrt{2}}{2} = 0.71$	$\frac{\sqrt{2}}{2} = 0.71$	1
60°	$\frac{\sqrt{3}}{2} = 0.87$	$\frac{1}{2}$	$\sqrt{3} = 1.73$
90°	1	0	$undefined$

MLO & Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	All	Understanding/ Application	**10**	Expect 100% to solve
2	6	Understanding	**3**	Expect 100% to solve
3	7	Application	**4.5**	Expect 90% to solve
4	1	Understanding/ Application	**5**	Expect 80% to solve
5	4	Understanding/ Application	**6**	Expect 60% to solve
6	1 & 2	Application	**5**	Expect 80% to solve
7	5	Understanding	**3**	Expect 100% to solve
8	8 & 9	Application	**3.5**	Expect 80% to solve