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

ACADEMIC YEAR 2023 – 2024

Program	Term	Semester	Paper
FOUNDATION	1	FALL	FINAL

MODULE NAME:	BASIC MATHEMATICS II		
MODULE CODE:	FMTH-004	EXAM DATE:	20/11/2023
TEACHER'S NAME:	Muhammad Javed	DURATION:	2 hrs.

Questions to be answered on:	Allowed requirements	Number of pages
Space provided on the question paper	Pen Pencil (only for drawing)	(Incl. Cover Page): 07

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.
- Any cheating/copying may fail the examination.

STUDENT NAME:	
STUDENT ID:	
CLASS:	

FINAL MARKS
40

Number of answer scripts: ……

Invigilator: …….....

Student's signature: ……

Time of receipt: …….....

Question 1 [10 Marks]

Write the correct answer on the line.

a. How many terms does the polynomial $2x^5 + x^4 + 4x^3$ have? _____

b. The discriminant of the general quadratic equation $ax^2 + bx + c = 0\ (a \neq 0)\ is\ D = b^2 - 4ac$. If $D > 0$, then how many real solution(s) is/are there for the equation? _____

c. Convert the following expression into an algebraic expression.

Variable y is 2 more than variable x. _____

d. Apply an appropriate inequality symbol.

If $x \leq 5$, then $3x$_____15.

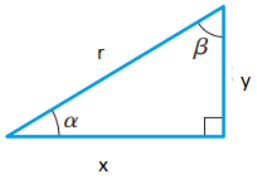
e. What is the distance between the points $A(-2, 0)$ and $B(0, 5)$? _____

f. What is the slope of a line perpendicular to the $x - axis$? _____

g. At what point does the line with the equation $y = 3x - 2$ intersect the $y - axis$? _____

h. To convert an angle from degrees to radians, we multiply the angle by _____

i. Which side of the triangle is opposite for angle β? _____



j. Which of the trigonometric ratios($\sin\theta$, $\cos\theta$ and $\tan\theta$) is/are positive in 2nd Quadrant? _____

Question 2 [6 Marks]

a. Simplify the algebraic expression given below.

$(2x - 5)(x^2 - x + 1)$ **(3 marks)**

b. Factorize the following expression.

$-7x^4 y^2 + 14xy^3 + 21xy^4$ **(3 marks)**

Question 3 [6 Marks]

a. Test the following equation for symmetry. **(3 marks)**

$$y = x^3 + 10x$$

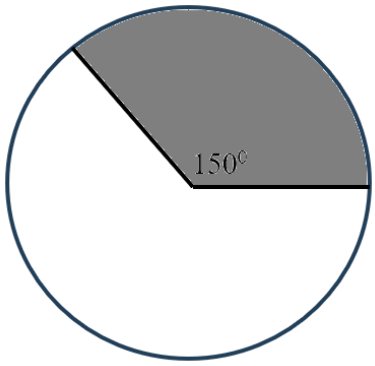
b. Find a point on the y-axis that is equidistant from the points $(5, -5)$ *and* $(1, 1)$. **(3 marks)**

Question 4 [5 Marks]

An executive in an engineering firm earns a monthly salary plus yearly bonus of OMR. 8500. If she earns a total of OMR. 97,300 per year, what is her monthly salary?

Question 5 [5 Marks]

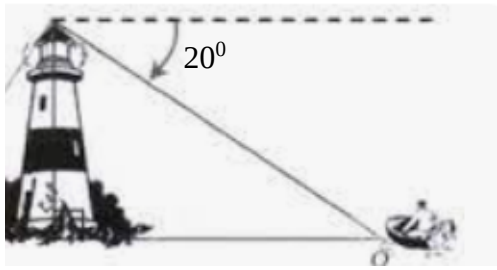
The area of a sector of a circle with a central angle of 150^0 is 90 m^2. Find the radius of the circle.



Question 6 [4 Marks]

From the top of a 150-ft lighthouse, the angle of depression to a boat in the ocean is 20^0. How far is the boat from the base of the lighthouse?

Note that $\sin 20^0 = 0.3$, $\cos 20^0 = 0.9$ *and* $\tan 20^0 = 0.4$



Question 7 [4 Marks]

Find the length **s** of the arc that subtends a central angle of measure 40^0 in a circle of radius 10 m.

Formula Sheet

S.No.	Formula	S.No.	Formula
1.	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	6.	$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
2.	$(a + b)^2 = a^2 + 2ab + b^2$	7.	Distance=$\sqrt{(x_2 - x_1)^2 (y_2 - y_1)^2}$
3.	$(a - b)^2 = a^2 - 2ab + b^2$	8.	Mid-point= $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
4.	$a^2 - b^2 = (a + b)(a - b)$	9.	Area of a sector = $\frac{1}{2} r^2\, \theta$
5.	$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$	10	$s = r\theta$, where $\boldsymbol{s}$ is the arc length of a circle.
6.	$(y - y_1) = m(x - x_1)$		Slope = $\frac{y_2 - y_1}{x_2 - x_1}$

References:

Larson, R. and Hostetler, R. (2007) *Precalculus*. 7th edn. Boston: Houghton Mifflin Company.

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