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	1	MAIN

MODULE NAME:	**APPLIED MATHEMATICS**		
MODULE CODE:	**FMTH006**	**EXAM DATE:**	**20/11/2023**
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)**:** **11**

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 [5 Marks]

a. There are 10 girls and 20 boys in a class. Half of the boys and half of the girls have blue eyes. Find the probability that a student chosen as class representative is either a girl or has blue eyes. **(3 marks)**

b. How many ways can a customer select 3 appetizers and 2 vegetables if there are 6 appetizers and 5 vegetables on the menu? **(2 marks)**

Question 2 [6 Marks]

A large bakery regularly orders cartons of blueberries. The average weight of the cartons is supposed to be 623 grams. The weights in grams of random samples of cartons from supplier were:

482 539 567 765 765

a. Is the average weight of the samples of cartons 623 grams? **(2 marks)**

b. Calculate the standard deviation of the weights of samples of cartons. **(4 marks)**

Question 3 [4 Marks]

A textile manufacturer has daily production costs of $\boldsymbol{C = 100000 - 110x + 0.045x^2}$, where $\boldsymbol{C}$ is the total cost (in dollars) and $\boldsymbol{x}$ is the number of units produced.

a. How many units should be produced each day to yield a minimum cost? **(2 marks)**

b. Calculate the minimum cost. **(2 marks)**

Question 4 [4 Marks]

Solve the following equation

$\mathbf{300(1.025)^{12t} = 1000}$.

Question 5 [4 Marks]

Two functions f and g are given below.

$\boldsymbol{f(x) = x + 2}$ $\boldsymbol{g(x) = 4 - x^2}$

a. Calculate $\boldsymbol{fog}$. **(2 marks)**

b. Calculate $\boldsymbol{gof}$. **(2 marks)**

Question 6 [5 Marks]

If a task is learned at a performance level P_0, then after a time interval t the performance level P satisfies $\log P = \log P_0 - c\log(t+1)$, where c is a constant that depends on the type of task and t is measured in months.

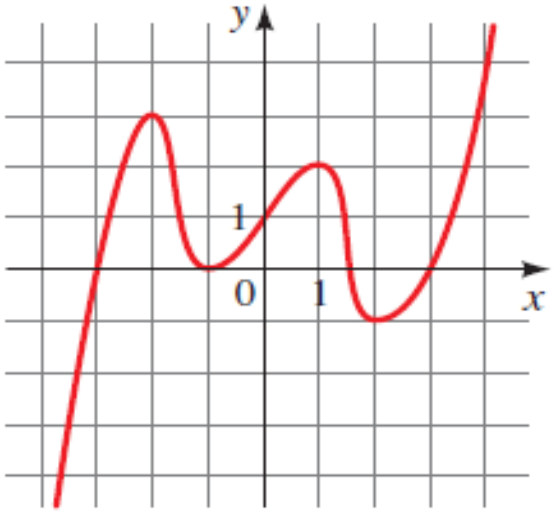
a. Solve the equation for P. **(3 marks)**

b. Use the equation in part (a) to estimate a student's score on a biology test three years after he got a score of 70 on a test covering the same material. Assume that $c = 0.3$ and t is measured in months. **(2 marks)**

Question 7 [6 Marks]

The graph of a function ***f*** is given below. Use the graph to do the following tasks.

a. Calculate the domain and range of the function. **(1.5 marks)**



(Stewart, Redlin and Watson, 2017)

b. Calculate all the local maximum and minimum values of the function and the value of x at which each occurs. **(2 marks)**

c. Find the intervals on which the function is increasing and on which the function is decreasing.

(2.5 marks)

Question 8 [6 Marks]

The system of inequalities is given below.

$y \leq -2x + 8$ $y > -\frac{1}{2}x + 5$

a. Graph the solution set of the system of inequalities. **(4 marks)**

b. Find the coordinates of all vertices. **(1 mark)**

c. Determine whether the solution set is bounded or not. **(1 mark)**

Formula Sheet

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

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.