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

Final Exam
TCOMP: COMPUTER APPLICATION
Spring 2025

Points of attention:

- For each question, the maximum earned points are specified in the question.
- Write clearly! Answers that are not readable are not marked and don't earn marks!
- All answers should be written in English using **blue or black pens** only.
- Use the pencil only for diagrams and graphs.
- Show all the calculation steps in the given space.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

Exam Duration: 2 hours
Instructor's Name: Amer Alhabsi
Exam Date: 22/06/2025
Program: PE

	45
	10

Student Information			
Name:		ID:	
Signature:			

Invigilator			
Initials:		☐ Student ID checked	
Time received:			

Question 1 **[16 marks]**

Download the Excel sheet Problem1.xlsx from Moodle at **moodle.imco.edu.om** [not Blackboard]. Fill in the Student Information on first Tab.

(a) On the **'Basic Functions'** sheet, complete all the cells highlighted in green. This sheet represents salary information for a small company. Column D shows the basic salary.
   a. Calculate/Fill the **housing allowance** as a percentage of the **basic salary** (column D). The percentage is given in **cell E2**, and your formula must reference this cell. (2 marks)
   b. The transportation allowance is 10% of the basic salary for people whose basic salary is less than or equal to 1000, and 15% of the basic for those making above 1000. (2 marks)
   c. Calculate the total salary by adding the basic, the housing and the transportation allowances. (2 marks)
   d. Apply conditional formatting to the total salary column. Highlight cells with total salary above 1800 with Dark blue background and white text. Also highlight cells with salaries less than 1200 with red background and white text. (2 marks)
   e. Calculate the mean, the lowest and highest values for the basic salary, all allowances and the total salaries. Store the results in rows 63-65. (2 marks)

(b) The Sales Worksheet tab shows sales data for a company selling cars of different models (year). You are asked to summarize the data into two pivot table. First calculate the value of the total sales given the quantity sold (qty) and the unit price.
   a. Create a pivot table where the rows represent the model, and the columns represents the year. Use the total for the values. (3 marks)
   b. Create another pivot table. In this one, use the year for rows, model for the columns and **qty** for the value. (2 marks)
   c. In 2025, how many Ford 150 were sold. Write the value in cell B1. (1 mark)

Question 2 **[14 marks]**

(a) Create a Word document with the specifications below. For each section and subsection, add dummy text using the function `=lorem(20)`. Use style sheet for all titles and headings. The styles are: (5 marks)

Heading 1: Font Arial, Size 30, color: dark brown, left aligned.

Heading 2: Font Helvetica, color: red, size 20, left aligned

Normal: font: Garamond, color: black, size 11, justified.

Title: font: Arial, size: 32, color: dark blue, right aligned.

The document has the following structure:

Title: Power Plant Optimization

Introduction

Background

History

Procedure

Conclusion

(b) X Add the following equation in the anywhere in the Introduction (3 marks).

$$\int_0^{\infty} \frac{\sqrt{x^2+2}+1}{\pi}\,dx$$

(c) Add a reference for a book. The title of the book is Machine Learning, author: John Doe, year:2018, publisher: Oxford Press. Include in text citation somewhere in the History sub-section. Also include a bibliography at the end. (3 marks).

(d) Add a header with 3 sections. The right section is right aligned with the text: TCOMP. The middle section is centrally justified with text showing your first name. The right section is right aligned with a page number. Include a line below the three sections (3 marks).

Question 3 **[10 marks]**

Let the energy (E) of a body of mass (m) be given by

$$E = mv^2$$

Where v, is the body velocity.

(a) Write v as a function of E and m (2 marks).

(b) Write a Python function in Jupiter Notebook that takes energy E and mass *m* as input and returns the velocity v. (5 marks).

(c) Test the function for m=2.3 and E=8000. Test again for m=0.02 and E =3x10^8. (3 marks)

Question 4 **[5 marks]**

Let x represents time in seconds and f(x) represents the voltage of a load in (V). Write a Python program to plot

$f(x) = \sin(20x) \exp(-0.4x)$ in the range $0 \leq x \leq 6\pi$

Display in the plot ***all*** necessary labels. Show a grid. Add your name as the title. Ensure the plot looks ***smooth***.

MLO and Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	**1, 3**	Apply	**16**	
2	**2**	Apply	**14**	
3	**3**	Create	**10**	
4	**3, 4**	Create	**5**	

No questions beyond this point.

The following are commonly used statements you may or may not find them useful in your exam.

```
import math
import numpy as np
import matplotlib.pyplot as plt
```

Common Numpy functions:

```
np.sin()
np.cos()
np.tan()
np.sqrt()
np.log()
np.log10()
np.exp()
np.pi
```

Common Matplotlib.pyplot functions

```
plt.plot()
plt.linspace()
plt.grid()
plt.saveplot()
plt.title
plt.xlabel()
plt.ylabel()
```

Common Math functions:

```
math.sin()
math.cos()
math.tan()
math.sqrt()
math.log()
math.log10()
math.exp()
math.pi
```