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

ACADEMIC YEAR 2023 - 2024

Program	Year	Semester	Paper
ME	4	1	MID-EXAM

MODULE NAME:	**ELECTRO TEHNOLOGY-IV**		
MODULE CODE:	**MELECTRO-IV**	**EXAM DATE:**	**07.11.2023**
INSTRUCTOR's NAME:	**Dr.Abdul Hameed Kalifullah**	**DURATION:**	**1.5 hrs.**

Questions to be answered on:	**Allowed tools:**	**Number of pages**
✓ Space provided on the question paper	Pen, Pencil & Calculator	(Incl. cover page): **6**

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 should be written **in English.**
- Write all the answers in **blue or black pen only.**
- Use the **pencil** only for **diagrams & 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.

STUDENT NAME:

STUDENT ID:

FINAL MARKS	
	20
	10

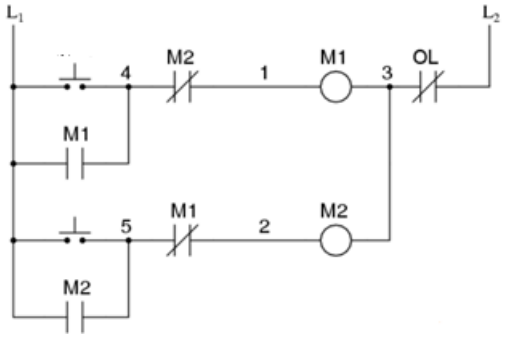
Number of answer scripts:……..…….. **Invigilator:**……..…….

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

Answer ALL questions

1. You are the engineer on a cargo ship. During routine checks, you find the overload relay for a conveyor belt motor has tripped. State four possible reasons for this trip and how you would troubleshoot the issue. **[4 marks]**

2. Given below is the ladder diagram for a motor control circuit. Study the diagram and answer the following:



(www.allaboutcircuits.com, n.d.)

a) Identify the components used in this circuit.

b) Explain the sequence of operation when both push buttons are pressed.

c) What is the purpose of thermal overload relay (OL) in the circuit?

d) Draw the corresponding schematic diagram. **[6 marks]**

3. Explore the use of Variable Frequency Drives (VFDs) in marine propulsion systems. Discuss their advantages and limitations compared to traditional speed control methods. **[3 Marks]**

4. You are the electrical engineer on a ship responsible for specifying the starting method for motors. A new 15 kW, 440V centrifugal pump operating at 0.8 power factor is being installed in the engine room cooling water system which frequently starts and stops during operation. Calculate the load current of the motor.

   Evaluate the suitability of the following two starting methods for this motor and justify your chosen option:

   a) Direct on line starter

   b) Star-delta starter **[4 Marks]**

5. Explain the significance of different motor starting methods in marine applications. What factors influence the choice of a particular starting method for a given motor? **[3 Marks]**

MLO & Bloom's Level of Complexity

Q #	MLO Addressed	Complexity Level	Mark	Remark
1	MLO1/MLO2	Application/Analysing	4	
2	MLO 3	Analysing	6	
3	MLO2	Application	3	
4	MLO 3	Analysing	4	
5	MLO1/ MLO2	Understating/ Application	3	

References:-

www.allaboutcircuits.com. (n.d.). Motor Control Circuits | Ladder Logic | Electronics Textbook. [online] Available at: https://www.allaboutcircuits.com/textbook/digital/chpt-6/motor-control-circuits/.