UNIVERSITI KUALA LUMPUR

MALAYSIAN INSTITUTE OF MARINE ENGINEERING TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	LED 20603
COURSE NAME	:	PROGRAMMABLE LOGIC CONTROLLER
PROGRAMME NAME	:	DIPLOMA OF ENGINEERING TECHNOLOGY IN ELECTRICAL & ELECTRONICS (MARINE)
DATE	:	24 MAY 2016
TIME	:	02.00 PM – 5.00 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please CAREFULLY read the instructions given in the question paper.
2. This question paper has information printed on both sides of the paper.
3. This question paper consists of TWO (2) sections; Section A and Section B.
4. Answer ALL questions in Section A. For Section B, answer THREE (3) questions only.
5. Please write your answers on the OMR answer script and answer booklet provided.
6. Answer all questions in English / Bahasa Melayu language ONLY.

THERE ARE 9 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 25 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

1. Choose the right answer for below description:
Data table is been use to stores the information as below for user program except:

A. Input table
B. Output table
C. External module
D. Internal relay

2. Choose the right answer for below description:
Digital input function is to receive and convert field signals into a form that can be used by the CPU. Below are examples of digital input module except:

A. Push button
B. Proximity sensor
C. Temperature sensor
D. Limit switches

3. Choose the right answer for below description:
By means of indicator lights, push buttons etc. The operator can monitor the data received from the machine (pump, flow sensor, turbidity sensor) or start a pump or a motor.

A. Human machine interface
B. Programmable logic control
C. Data processing
D. Data acquisition

4. Choose the right answer for below description:
The choice of programming language is depend on below items except:

A. The problem at hand
B. The structure of the control system
C. The level of describing the problem
D. The country that invented the PLC

5. Choose the right answer for below description:
The sensors on the machine interpret all kinds of physical values (movements or actions) and transform them into standard electrical signals that are transmitted to the control system

A. Human machine interface
B. Programmable logic control
C. Data processing
D. Data acquisition

6. Name a programming language that known as sequential function chart in below answer

A. Ladder diagram
B. Grafcet
C. Logic program
D. Statement list

7. Choose the right answer for below description:
Information concerning the actions and control sequences, for controlling the power components and communicating via the human machine interface:

A. Human machine interface
B. Programmable logic control
C. Data processing
D. Data acquisition

8. Identify type of volatile memory that can read and write easily and usually, PLCs that use CMOS-RAM include battery back-up.

A. Read Only Memory (ROM)
B. Random Access Memory (RAM)
C. Erasable Programmable Read Only Memory (EPROM)
D. Electrically Erasable Programmable Read Only Memory (EEPROM)

9. Identify type of non-volatile memory that can read only and usually information stored by manufacturer for internal use of the PLC

A. Read Only Memory (ROM)
B. Random Access Memory (RAM)
C. Erasable Programmable Read Only Memory (EPROM)
D. Electrically Erasable Programmable Read Only Memory (EEPROM)

10. There are several types of PLC language been used in industry and for educational. Identify the correct criteria when choosing the type of PLC to be used.

A. The manufacture of PLC
B. The programmer
C. The price of PLC
D. The complexity of the task and possible future expansion

11. Recognize two(2) types of PLC module widely been used in industry sector and also for educational matter.

A. Compact and modular
B. Compact and complex
C. Complex and modular
D. Compress and modular

12. Identify type of non-volatile memory that can be reprogrammed after being entirely erased with the use of an UV light source.

A. Read Only Memory (ROM)
B. Random Access Memory (RAM)
C. Erasable Programmable Read Only Memory (EPROM)
D. Electrically Erasable Programmable Read Only Memory (EEPROM)

13. Identify the logic function of electrical diagram in Figure 1 below. It is a:

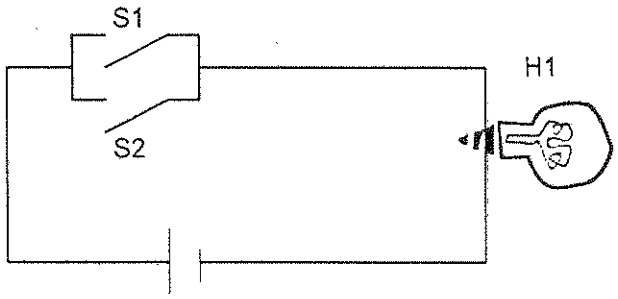


Figure 1

A. OR
B. AND
C. INVERSE
D. NAND

14. Identify the logic function of electrical diagram in Figure 2 below. It is a:

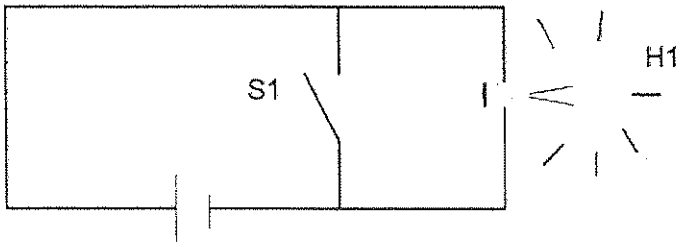


Figure 2

A. OR
B. AND
C. INVERSE
D. NAND

15. Choose the right answer for below description:
Data interface permits the transfer of data table between the input modules to PLC processor. This type of dialogue allows below process except.

A. Copying of the configuration
B. Lecture of the configuration
C. Writing of the configuration
D. Default processing

16. Choose which of the following was not one of the primary goals associated with the development of PLC's?

A. To eliminate hardwired relays system

B. To reduce machine downtime

C. To ease troubleshooting

D. To replace mainframe computer

17. Choose the right answer for below description:

The connection for programming PLC as below except:

A. Wireless connection

B. Point to point connection

C. Connection through a network

D. Using a hand-held programming terminal

18. Define the type of language for the Figure 3 below:

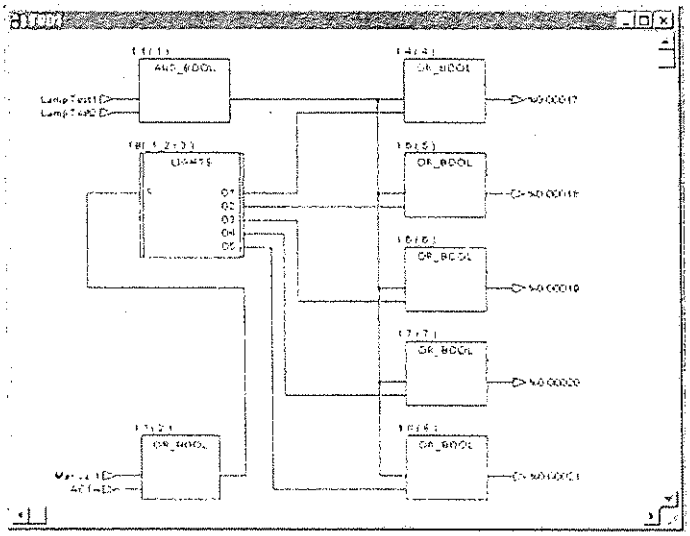


Figure 3

A. Ladder Diagram

B. Sequential Function Chart

C. Instruction List

D. Function Block Diagram

19. Recognize the correct basic components of PLC

A. Power supply, Central processing unit (CPU), Input modules and Output modules

B. Power supply, Input modules, output modules and controllers

C. Central processing unit (CPU), Input modules, output modules and controller

D. Power supply, Central processing unit (CPU), output modules and controller

20. Choose the right answer for below description:

This type of function chart has the waiting step for synchronization and proceeds to next step. Identify the type of function chart relate to the description.

A. Jump sequence
B. Alternative sequence
C. Repeat sequence
D. Simultaneous sequence

21. Choose the right answer for below description:

The hexadecimal number 2C has a decimal equivalent value of

A. 14
B. 44
C. 64
D. None of the above

22. Choose the right answer for below description:

The purpose of input/output interface is to _____ the various signals received from or sent to the external field devices.

A. Sense and control
B. Provide isolation to
C. Condition
D. All of the above

23. Define the type of language for the Figure 4 below

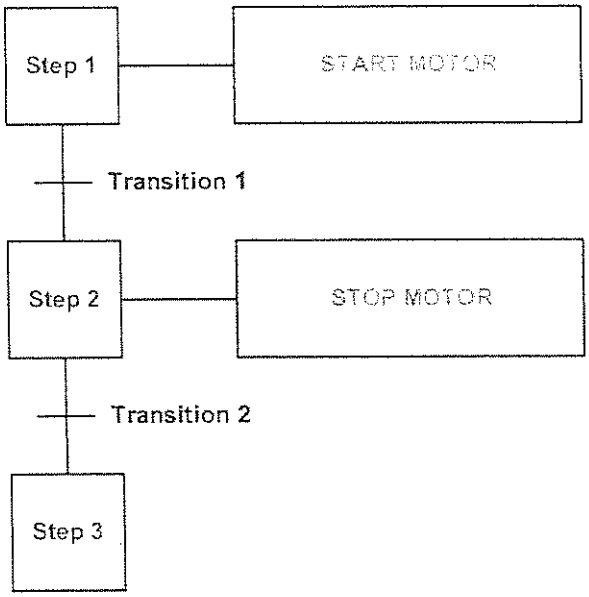


Figure 4

A. Ladder Diagram
B. Sequential Function Chart
C. Instruction List
D. Function Block Diagram

24. Define below ladder diagram symbol in Figure 5

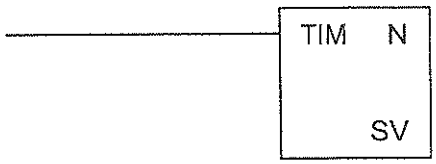


Figure 5

A. Counter
B. Timer
C. TR bits
D. Latching

25. Choose the right answer for below description:

The following recommendations address preliminary considerations for the location and physical aspects of a PLC enclosure except:

A. The enclosure should be located so that the doors can fully open for easy access when testing or troubleshooting wiring and components.
B. The enclosure should be located at a high place to keep it safety
C. The enclosure's back panel should be removable to facilitate mounting of the components and other assemblies.
D. The enclosure should include accessories, such as AC power outlets, interior lighting, and a gasket, clear acrylic viewing window, for installation and maintenance convenience.

SECTION B (Total: 75 marks)

INSTRUCTION: Answer only THREE (3) questions.
Please use the answer booklet provided.

Question 1

a. The programmer need to identify which types of PLC language need to be used in order to program a control system of a motor on a board ship. State four(4) dependents point when choosing the type of programming language.

(4 marks)

b. A programmable logic control module contains a memory that can be classify into two; volatile memory and non-volatile memory.

i. Differentiate of volatile memory and non-volatile memory

(4 marks)

ii. State four(4) types of memory and explain characteristics of the memory

(12 marks)

c. State five(5) types of programming language internationally recognized.

(5 marks)

Question 2

a. Inside the PLC processor, there have three types of interface standard that managed by software intelligent module. List down three(3) of the interface inside the processor and explain each of the interface.

(9 marks)

b. State five(5) functions inside the analogue output interface.

(5 marks)

c. Sketch and explain a block diagram of an analogue measurement principle.

(11 marks)

Question 3

A basic pneumatic control system of a double acting cylinder using PLC is been program using a ladder diagram.

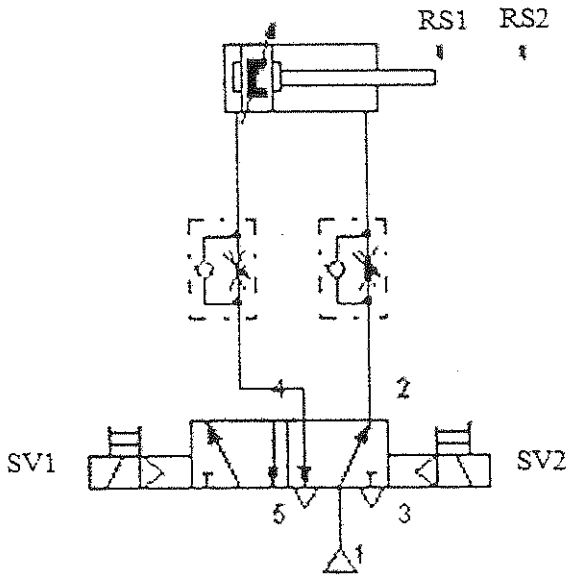


Figure 6: Pneumatic control circuit

Question: Analyze and convert the pneumatic control system of a double acting cylinder in Figure 6 above into a PLC control.

a. State the input list and output list

(6 marks)

b. Sketch the input/output wiring diagram to the PLC

(6 marks)

c. Design a program to control the cylinders above with sequence AABB ad below sequences.

- Design and build a circuit (ladder program) to control a double acting cylinder, where the cylinder is to extend and on completion of the extension stroke retract. The circuit is to include an Emergency Stop function that will return the cylinder to its home position.

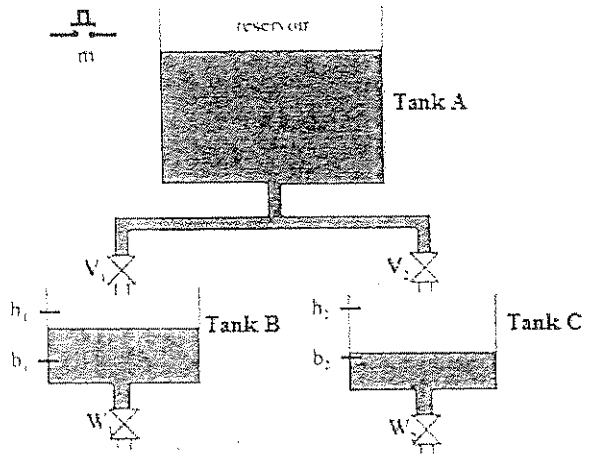
(9 marks)

d. Explain the operation of the program for every ladder

(4 marks)

Question 4

A model of a water distribution system as below:



- m is the push button to open valve in upper tank.
- h_1 and h_2 are the sensor to detect the maximum level of water inside both tank.
- b_1 and b_2 are the sensor to detect the minimum level of water inside both tank.

Figure 7

a. State the input and output of the system in a proper I/O table

(9 marks)

b. Create a grafcet from the system in Figure 7. The water distribution systems have 4 valves controlled by a push button and sensors at the upper and lower of the water tank.

(16 marks)

END OF EXAMINATION PAPER