Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2023

Programme Name: B Tech (ME)

Semester: IV

Subject Code: UG11T3402

Subject Name: Digital Electronics and PLC

Date: 02.06.2023	Max Marks: 70
Duration: 03 Hrs	Pass Marks: 35

General Instructions

(i) All Sections (A, B & C) are to be attempted.
(ii) Options, if any, are specified in respective section.

QP setters to specify the following as applicable:-

(iii) Ordinary Graph sheets be provided.

Section A

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Bubbled OR gate is equal to
   (a) NOR
   (b) XOR
   (c) NAND
   (d) AND

2. If *n* denotes the number of variable, then the number of cells in Karnaugh map is
   (a) 2^n
   (b) 2+n
   (c) 2-n
   (d) 2n

3. In Toggle mode, a JK flip-flop has
   (a) J=0, K=0
   (b) J=0, K=1
   (c) J=1, K=0
   (d) J=1, K=1

4. How many times loop will be executed

```
LXI B, 000A
LOOP  DCX B
      MOV A,B
      ORA,C
      JNZ LOOP
```

   (a) 5
   (b) 10
   (c) 2
   (d) 1

5. An 8x1 Mux has how many selection lines?
   a)1
   b)2
   c)3
   d)4

6. Which flag is used internally by the Microprocessor for its carry operations?
   a)Sign Flag
   b)Carry Flag
   c)Auxiliary Carry Flag
   d)Zero Flag

7. Why timer is not placed inside MCR function?
   (a) MCR turns all outputs to off
   (b) MCR turns off only non-retantive outputs
   (c) MCR turns off all retantive outputs
   (d) None of the above

8. In PLC Input instruction, Latch instruction is
   (a) When contact closes, the function is ON
   (b) When contact closes, the function is OFF
   (c) When contact closes, the function is ON and stays ON even if contact opens
   (d) When contact closes, the function is OFF and stays OFF even if contact opens.

9. An 8 bit A/D converter has a range of 0-5V. What is approximate resolution of the converter?
   (a) 40mV
   (b) 20mV
   (c) 10mV
   (d) 5mV

10. Transducer is a _____ device.
    (a) Energy storing
    (b) Energy converting
    (c) Energy producing
    (d) All of the above

Section B

Five Questions of 02 Marks each

11. Implement OR gate using NAND gates.
12. What are the functions of Accumulator?
13. Which programming languages are used in PLC?
14. Draw ladder logic to represent full adder.
15. Solve the following Boolean expression by reducing it to the minimum terms:

    XY+X'Z+YZ

Section C

Seven Questions of 10 Marks each of which any 05 questions to be answered.

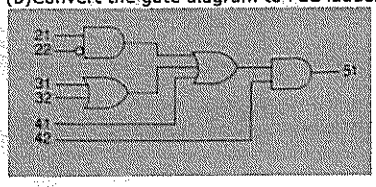
16. Simplify the following Boolean function using Karnaugh map method: $f(A,B,C,D)=\Sigma(1,4,6,7,8,9,10,11,15)$. (10)

17. Explain with circuit diagram and truth table, operation of a CMOS-NAND gate. (10)

18. Explain the architecture of 8085 microprocessor in detail with neat sketch (10)

19. Explain Analog to Digital Converter and Digital to analog converters. With the help of diagram, show how are ADC and DAC used by a digital system to sense and control physical variables. (10)

20. (a)Discuss I/O (AI.AO.DI,DO)components of PLC. (5)
    (b)Convert the gate diagram to PLC ladder Logic. (5)



21. Draw the SCADA architecture and explain the different levels involved in a control and monitoring process? (10)

22. Describe the operation of CRO with neat sketch (10)