Indian Maritime University

(A Central University, Govt of India)

End Semester Examinations – June 2024

Programme Name: B Tech (ME)

Semester: IV

Subject Code: UG11T3402

Subject Name: DIGITAL ELECTRONICS AND PLC

Date: 03.06.2024 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.

Section A

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

1 How many unique digits are present in the octal system
a)2 b)8 c)10 d)7

2 The voltage value of binary state 1 is
a)0 b)-5V c)+5V d)0.5V

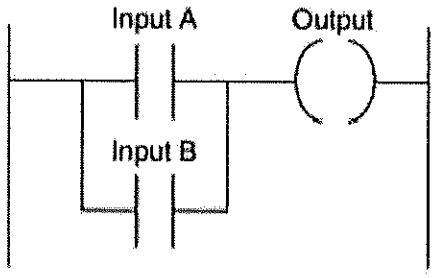
3 In a BCD representation, how many bits are used to represent all the 10 digits?
a)10 b)9 c)3 d)4

4 For the minterm (X.Y'.Z) the equivalent binary number is:
a)100 b)101 c)110 d)010

5 Which of the following has fixed AND logic and programmable OR logic
a)PROM b)PAL c)PLA d) PLC

6 Which of the following are the major parts of a PLC?
a)CPU b)Input Unit c)Output Unit d) All of the above

7 The following ladder diagram is the logic representation of which gate?



a) OR Gate b) AND Gate c) NOR Gate d) NAND Gate

8 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

9 A tachometer is used to measure _____?

a) Pressure b) angular velocity c) Rate of Flow of a fluid d) Vibration

10 An 8x1 Mux has how many selection lines?

a)1 b)2 c)3 d)4

Section B

Five Questions of 02 Marks each

11. Draw the SR Latch using NOR Gates with its function table and explain what is the forbidden state.

12. Solve the following Boolean expression by reducing it to the minimum terms: XY+X'Z+YZ

13. What is a transducer? Give two examples of transducers and mention the parameter it measures.

14. What are the different buses and their uses in 8085 microprocessor?

15. What does 'NO' and 'NC' stand for in a relay? Explain the function of each in the normal and relay energised state.

Section C

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

16 Demonstrate how a D Latch and JK Flip Flop can be made from a SR latch. (5+5)

17 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. (3+7)

18 What are the various components of PLC? Explain each of them in detail with a diagram. (10)

19 What are addressing modes of 8085 microprocessor? (3+7)
Write a 8085 code with explanation for each line of code to do the following:

Load the register B with $3C_H$
Load the register C with 81_H
Add contents of B and C and store the sum in D
Find the difference between the contents of B and C and store in H
Find the logical OR of B and C and store in B

20 Draw and explain the working of a relay logic diagram for motor ON and OFF with signal lamps. (10)

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

22 Draw the architecture of 8085 microprocessor and explain. (10)