MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

DEPARTMENT OF MECHATRONICS
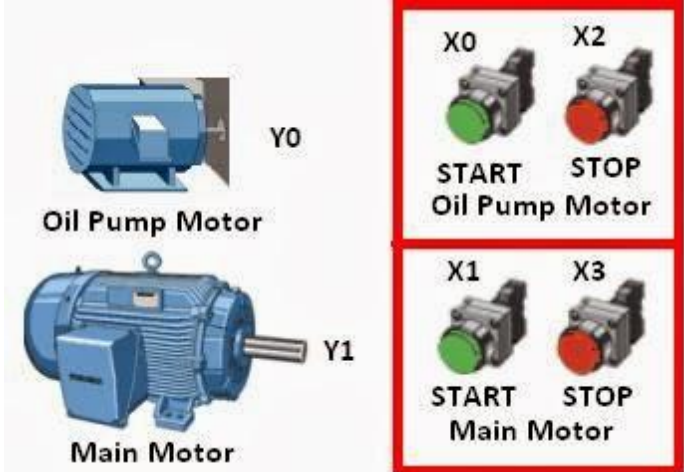## VII SEMESTER B. TECH MECHATRONICS ENGINEERING
END SEMESTER EXAM

Subject: Industrial IoT **Subject Code: MTE 4304**
Time: 2:00PM-5:00PM **Date: 25/11/2022**

Important Instructions:
1. Answer all the questions
2. Data not provided may be suitably assumed and justified.

S. No.	Question	M	CO	PO	LO	BL
1A	Develop PLC programs involving arithmetic instructions (i) Addition (ii) Subtraction (iii) Multiplication (iv) Division	4	CO3	1,2	1,2	6
1B	Elaborate the query response mechanism of Modbus communication protocol deployed in automation. Draw and explain Modbus message frame.	3	CO4	2,5	2,6	6
1C	Design PLC ladder logic for stair-case wiring using two toggle switches for Figure 1(c) and describe the ladder program steps. Figure 1(c)	3	CO3	2,5	2,5 ,6	6
2A	Design a three-way traffic light control using PLC ladder logic for the Figure 2(a), and explain the logic steps. Figure 2(a)	4	CO3	2,5	2,5 ,6	6

2B	Design a PLC Ladder logic for Providing gearbox lubricant before the lathe spindle starts to run which aims to ensure that the oil pump motor starts first and the main motor starts subsequently as given in Figure 2(b). Figure 2(b)	4	CO3	2,5	2,5 ,6	6
2C	Distinguish between Programmable Logic Controller (PLC) and Personal Computer (PC).	2	CO3	1,2	1,3	4
3A	Define Database engine? Explain Storage manager, Query processing and Transaction manager in detail.	4	CO5	2,5	1,2 ,6	5
3B	Explain HART (Highway Addressable Remote Transducer) Communication Protocol on following points. i. Theory of operation ii. Communication modes iii. Classes of commands	3	CO4	3,5	3,6	5
3C	Determine the four important functions that information security performs in an organization.	3	CO5	1,5	1,5 ,9, 10	5
4A	Define Process Field Bus and explain following types of Profibus i. Profibus-PA ii. Profibus-DP iii. Profisafe	5	CO4	3,5	5,6	5
4B	Define and analyse the various critical components of an information system, as well as their security requirements.	3	CO5	1,5 ,8	1,5 ,9, 10	4
4C	List the types of counters in PLC and explain each of them with appropriate functional diagram.	2	CO3	2,3	2,5	4
5A	Elaborate the following i. Real time Ethernet ii. EtherCAT	4	CO4	3,5	5,6	4
5B	Create a Security Systems Development Life Cycle (SecSDLC) using the Systems Development Life Cycle (SDLC). List the steps that are unique to the SecSDLC in each phase of the SDLC.	4	CO5	3,6	5,9 ,10	6
5C	List any four drawbacks of use of file systems to store data.	2	CO5	1,5	1,6	4