28. a.	Discuss the hardware elements and their functions in a DCS with neat block diagram.	10	4	3	2
	(OR)				
b.	Explain the three different LCU configurations and its important role in a DCS.	10	4	3	2
29. a.i.	Outline various displays used in DCS and their specific functions.	5	4	4	2
ii.	Illustrate any five online diagnostic features.	5	3	4	2
	(OR)				
b.	Describe the functions of a low level and high level engineering interface in DCS.	10	4	4	2
30. a.	Draw the SCADA architecture block diagram and explain the functions of each.	10	3	5	2
	(OR)				
b.	Briefly discuss the communication protocols used in a SCADA system with respect to RTU/MTU and explain their functioning.	10	4	5	2

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Reg. No.															

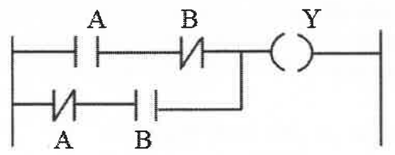
B.Tech. DEGREE EXAMINATION, NOVEMBER 2022
Sixth and Seventh Semester

18EIO133T – INDUSTRIAL AUTOMATION SYSTEMS
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

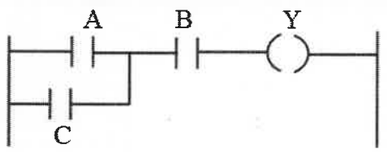
PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
1.	PLC's are designed for _____inputs and _____outputs. (A) Single, single (B) Single, multiple (C) Multiple, single (D) Multiple, multiple	1	1	1	1
2.	A medium type PLC has _____I/O points. (A) 15 (B) 15 to 128 (C) 128 to 512 (D) Over 512	1	1	1	1
3.	Based on I/O configuration, PLC are classified as _____and _____ (A) Fixed, modular (B) Fixed, medium (C) Modular, medium (D) Modular, industrial	1	2	1	1
4.	Solenoids are _____type of switching devices. (A) Electrical (B) Electromechanical (C) Electrochemical (D) Electromagnetic	1	1	1	1
5.	_____separates AC input voltage from logic circuits in a PLC. (A) Diode (B) Optical isolator (C) Switch (D) Transistor	1	1	1	1
6.	The equivalent Boolean expression of  (A) Y=AB+A'B' (B) Y=A'B+AB' (C) Y=(AB)'+(AB) (D) Y=A'+B'+A+B	1	2	2	1
7.	A retentive timer _____ the time when it loses power (A) Erases (B) Retains (C) Reset to zero (D) Does not change	1	1	2	1

8. In ladder logic, the data type of NO contact is 1 1 2 1
(A) Int (B) Word
(C) Bool (D) Dint

9. An example of discrete control is _____ 1 2 2 1
(A) Varying volume of speaker (B) Turning on/off lamp
(C) Controlling speed of fan (D) Adjusting light intensity

10. The output Y of the Boolean logic is 1 2 2 1



(A) Y=AB+C (B) Y=A+B.C
(C) Y=AC+B (D) Y=(A+C).B

11. The number of analog input in LCU-A configuration is 1 1 3 1
(A) 1 (B) 2
(C) 3 (D) 4

12. A device that allows operator to interact with LCU is _____ 1 1 3 1
(A) High level HMI (B) Low level HMI
(C) High level EI (D) Low level EI

13. Function of high level computing device is to _____ 1 1 3 1
(A) Control process (B) Interact with LCU
(C) Interface with process (D) Perform plant management

14. Number of digital outputs in LCU-A configuration is _____ 1 1 3 1
(A) 1 (B) 2
(C) 3 (D) 4

15. Name the smallest unit that can perform control action in DCS. 1 1 3 1
(A) Low level HMI (B) High level HMI
(C) Local control unit (D) Local coordinate unit

16. Identify the hardware element used for alerting operators. 1 1 4 1
(A) Controller (B) Actuator
(C) Annunciator (D) Messenger

17. Maximum number of group displays configured in an universal station is _____ 1 1 4 1
(A) 50-100 (B) <200
(C) >200 (D) 400-500

18. Indicate the foremost step to be done in case of multi loop failures. 1 1 4 1
(A) Multiple shutdown (B) Multiple alarms
(C) Data backup (D) Manual to auto changeover

19. A group level display is meant for _____ 1 1 4 1
(A) Batch sequences (B) X-Y trends
(C) Alarm summary (D) Tuning display

20. Auto manual switchover is also referred to as _____ 1 1 4 1
(A) Dependent (B) Independent
(C) Interdependent (D) Override

21. _____are electronic devices that help to communicate between objects connected in a SCADA. 1 1 5 1
(A) MCS (B) DCS
(C) RTU (D) LCU

22. Instructions for operating RTU in a SCADA system is given by _____ 1 1 5 1
(A) MTU (B) MCS
(C) Field devices (D) Control room

23. Identify the operation which is not a part of RTU. 1 1 4 1
(A) Analog control (B) Discrete control
(C) Data storage (D) Data monitoring

24. _____system acts as communication server between PLCs and HMI in control rooms. 1 1 4 1
(A) Data manipulation (B) Data processing
(C) Supervisory (D) Communication

25. Indicate the one which is not a part of SCADA system. 1 1 4 1
(A) Communication (B) HMI
(C) PLC's (D) Memory interface

PART – B (5 × 10 = 50 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
26. a.	Outline the important advantages of PLC based control and write five differences between PC and PLC.	10	4	1	2
	(OR)				
b.	Show the block diagram, and explain the functions of each block in a PLC.	10	3	1	2
27. a.	Model a PLC ladder diagram to show the time-of-day clock, in hours and minutes.	10	4	2	2
	(OR)				
b.	Model a PLC ladder logic for 2 way traffic light control system.	10	4	2	2