b.	Model a ladder logic to implement 2 way traffic light control system.	12	3	2	2
30. a.	Classify the requirements and design constraints involved in the LCU process interfacing and security.	12	4	3	1
	(OR)				
b.	Categorize LCU based on different aspects and explain each of them.	12	4	3	1
31. a.	Show the comparison between various levels of display system used in DCS.	12	3	4	2
	(OR)				
b.	Outline the functionalities of high level and how level engineering interfaces in DCS.	12	4	4	2
32. a.	Show the SCADA architecture with neat block diagram and explain the functions of each block.	12	3	5	1
	(OR)				
b.	Outline the significant functions of RTU and its communication capabilities.	12	4	5	1

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Reg. No.														

B.Tech. DEGREE EXAMINATION, JUNE 2023
Fourth to Seventh Semester

18EIO133T – INDUSTRIAL AUTOMATION SYSTEMS
(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

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 & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

		Marks	BL	CO	PO

PART – A (20 × 1 = 20 Marks)
Answer **ALL** Questions

1. _____type of proximity sensors detect both metals and non-metals. 1 1 1 1
(A) Capacitive (B) Inductive
(C) Resistive (D) Magnetic

2. _____rectifier is used in a discrete AC input module. 1 1 1 1
(A) Bridge (B) Center tapped
(C) Center wedge (D) Twin diode

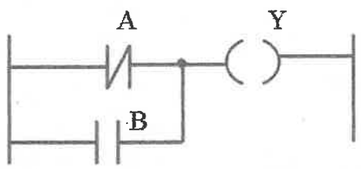
3. PLC's are classified based on their applications. Identify the odd one out of these. 1 1 1 1
(A) Micro PLC (B) Standalone PLC
(C) Multi-tasking type (D) Controller type

4. Nano PLC's support _____I/O points. 1 1 1 1
(A) <15 (B) >15
(C) >100 (D) 15 – 100

5. Other name of seal-in circuit is _____ 1 1 2 1
(A) Normally open (B) Normally closed
(C) Relay (D) Holding

6. Accumulated value of a timer represents the _____time. 1 1 2 1
(A) Base (B) Preset
(C) Elapsed (D) Remaining

7. For the given ladder logic, output (Y) has the expression 1 2 2 1



(A) $Y = A' \cdot B$ (B) $Y = A \cdot B'$
(C) $Y = A' + B$ (D) $Y = A + B'$

8. Typical scan time in a PLC is around _____ 1 1 2 1
(A) 1 μs (B) 200 ms
(C) 200 μs (D) 1 ms

9. Total number of digital outputs in LCU-A is _____ 1 1 3 1
(A) 1 (B) 2
(C) 3 (D) 4

10. First company to develop and manufacture DCS is 1 1 3 1
(A) ABB (B) Siemens
(C) Honey well (D) Centum

11. Function of a high level operator interface is to _____ 1 1 3 1
(A) Perform closed loop control (B) Interact with LCU
(C) Interface with process (D) Perform plant management

12. The location of Local Control Unit (LCU) in a DCS setup is in/nearby _____ 1 1 3 1
(A) Plant area (B) Control room
(C) Maintenance room (D) Warehouse

13. _____and _____are primary functions of lower level operator interface 1 2 4 1
(A) Process monitoring, controlling (B) Process metering, controlling
(C) Process monitoring, record keeping (D) Process display, automation

14. _____is a type of feedback mechanism while pressing push buttons. 1 1 4 1
(A) Tecton (B) Tactile
(C) Ductile (D) Optical

15. Power system diagnostics is carried out at _____intervals. 1 1 4 1
(A) Regular (B) Start / stop
(C) Shut down / maintenance (D) Change over

16. _____should be considered when designing the displays 1 1 4 1
(A) Efficiency (B) Ergonomics
(C) Economics (D) Sensitivity

17. In which year the term SCADA was coined 1 1 5 1
(A) 1952 (B) 1966
(C) 1970 (D) 1978

18. Control concept in SCADA is _____ 1 1 5 1
(A) Direct (B) Online
(C) Hybrid (D) Supervisory

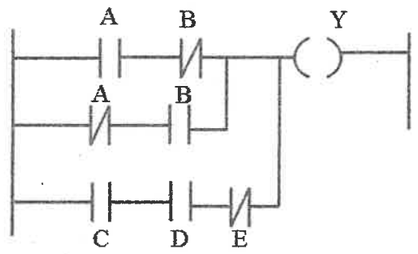
19. The system controller in SCADA is _____ 1 1 5 1
(A) Master terminal (B) Remote terminal
(C) Hybrid terminal (D) Server terminal

20. SCADA technology is best applied to _____processes spread over _____area. 1 2 5 1
(A) Large, large (B) Large, small
(C) Small, large (D) Small, small

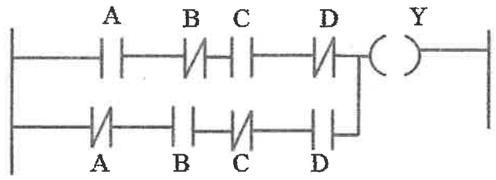
PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

	Marks	BL	CO	PO
21. Examine the functions of a power supply module in PLC.	4	3	1	1
22. Determine the output expression Y for the given ladder logic. (i)	4	3	2	2



(ii)



23. Show the significant development of DCS and its evolution.	4	3	3	1
24. Demonstrate various levels of displays with a neat diagram.	4	3	4	2
25. Enumerate the need for SCADA based control in power plants.	4	4	5	1
26. Show the block diagram of discrete AC input module.	4	3	1	1
27. Illustrate the significance of HMI and its design requirement.	4	3	3	1

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
28. a. Outline the basic architecture of a PLC with neat block diagrams.	12	4	1	1
(OR)				
b. Demonstrate the working principle of any 3 input and output devices with neat diagrams.	12	3	1	1
29. a. Model a ladder logic program, that will increment a counters accumulated value by 1 count for every 60 sec. A second counters accumulated value to increment every time when first counter reaches 60s. The first counter will reset when the accumulated value reaches 60 and second counter will reset when the accumulated value reaches 24.	12	3	2	2
(OR)				