U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**

Branch: Electronics & Instrumentation Engineering **Duration: 3 hrs.**

Course Code: 23EI6PCIDS **Max Marks: 100**

Course: Industrial Data Networks and Safety

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Describe the functions of seven layers in Open System Interconnection (OSI) model of ISO.	*CO1*	*PO1*	**10**
	b)		Discuss the Network hierarchy in the Industrial automation system and suggest suitable protocols at each level.	*CO1*	*PO1*	**10**
			OR			
2	a)		Distinguish between token passing approach and FDDI in detail.	*CO1*	*PO1*	**10**
	b)		Explain HDLC protocol frame format? Also describe NRM and ABM mode of operation.	*CO1*	*PO1*	**10**
			UNIT - II			
3	a)		With schematic diagram representation, explain the routers, switches and bridges to build standard Ethernet network.	*CO2*	*PO1*	**10**
	b)		Illustrate RS-232 communication protocol with no handshaking and handshaking connection with suitable diagrams.	*CO2*	*PO1*	**10**
			OR			
4	a)		Enumerate the advantages and applications of the following 10 Mbps Industrial standard Ethernet. i) 10BASE5 ii) 10BASE-T iii) 10BASE-F	*CO2*	*PO1*	**10**
	b)		Define Network topologies. Discuss its merits and demerits for any 3 types.	*CO2*	*PO1*	**10**

			UNIT - III			
	5	a)	Illustrate the message format, its commands, and implementation of the OSI layer model using HART protocol.	*CO3*	*PO1*	**10**
		b)	Generalize and interpret the concept of OLE for process control. Discuss the major components and importance of OPC.	*CO3*	*PO2*	**10**
			OR			
	6	a)	Describe the field bus technology's support for different topologies. Examine the automotive sector to demonstrate the same.	*CO3*	*PO2*	**10**
		b)	With a neat diagram explain the general Fieldbus architecture.	*CO3*	*PO2*	**10**
			UNIT - IV			
	7	a)	Design a MODBUS function code to Read output coil status and Read digital input status by developing request and response frame.	*CO3*	*PO2*	**10**
		b)	Discuss MODBUS frame. Illustrate how the exception is handled in MODBUS protocol.	*CO3*	*PO2*	**10**
			OR			
	8	a)	Compare and contrast between Profibus FMS, DP and PA versions.	*CO3*	*PO2*	**10**
		b)	Design an application process and its communication by using Virtual Field Device (VFD) with object dictionary using Profibus technology.	*CO3*	*PO2*	**10**
			UNIT - V			
	9	a)	Define functional safety. Discuss the safety standards of the IEC 61508 and IEC61511.	*CO4*	*PO6*	**10**
		b)	With suitable flow diagram illustrate the overall safety life cycle and E/E/PES lifecycle.	*CO4*	*PO6*	**10**
			OR			
	10	a)	Elucidate the role of Industry 4.0 in automation and data exchange in manufacturing using smart technologies.	*CO4*	*PO6*	**10**
		b)	Summarize on common functional safety protocols ProfiSafe, EtherCAT and CIP safety.	*CO4*	*PO6*	**10**

****