

Exam.	Regular		
Level	BE	Full Marks	60
Program	BEL	Pass Marks	24
Year/Part	III/II	Time	3hrs

Subject:- INDUSTRIAL INSTRUMENTATION AND AUTOMATION

Code: ENEE 351

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

Qu. No.	Question	Marks	Chapter No.
1.	I) What is Profibus? Explain its three versions. Explain DeviceNet and ControlNet.	[3+3]	1
2.	II) Identify and explain the five basic components of an industrial automation system, detailing how they interact. Provide a detailed comparative breakdown of Active Transducers and Passive Transducers using the core definitions and properties. Differentiate between Contact and Non-Contact sensors, and state two examples for each. Differentiate between Analog (Continuous) and Digital/Discrete transducers based on their output signals, and give two examples for each.	6	2
3.	Compare and contrast incremental and absolute encoders regarding how they measure positional data and how they handle system power loss. Furthermore, discuss the technological tradeoffs between optical and magnetic sensing mechanisms, specifically highlighting how operating environments influence selection.	6	2
4.	Explain the architecture of a Programmable Logic Controller (PLC) with a neat block diagram. Describe the function of each major component. Why has the Programmable Logic Controller (PLC) replaced conventional relay-based control systems in industrial automation? Explain with suitable reasons.	6	3
5.	Explain the working principle of a PLC-based Star-Delta Starter with the help of a ladder diagram. Describe the sequence of operation from motor starting to normal running.	6	3

6.	Explain the importance of relay isolation in drive and motor interfacing. Discuss the purpose of relay isolation, correct interfacing practices, the role of flyback diodes, and the common mistakes that should be avoided.	6	4
7.	Explain the industrial applications of HMI and differentiate between HMI and SCADA. Discuss the emerging trends in Human Machine Interface (HMI) technology. Explain each trend with its features and benefits.	6	5
8.	Discuss the communication layer and SCADA server in detail. Explain communication media, wired and wireless technologies, SCADA communication protocols, data collection, processing, alarm management, historical data storage, and report generation.	6	6
9.	Explain the concept of closed-loop actuation. Explain the concept of data acquisition (DAQ) in SCADA systems. Discuss its working process, core functions, key components, and importance in industrial automation.	[2+4]	4 & 6
10.	Explain the concept of Industry 4.0 in industrial automation. Discuss the role of sensor data, Industrial Internet of Things (IIoT), smart manufacturing, and digital transformation in modern industries.	6	7