Register Number:……..

KUMARAGURU
college of technology
character is life

B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

U18EIE0011: Industry 4.0

COURSE OUTCOMES

CO1: Comprehend the drivers and enablers of Industry 4.0
CO2: Understand the opportunities, challenges brought about by Industry 4.0 and how organizations and individuals should prepare to reap the benefits.
CO3: Outline the various systems used in a manufacturing plant and their role in an Industry 4.0 world
CO4: Analyze the power of Cloud Computing in a networked economy

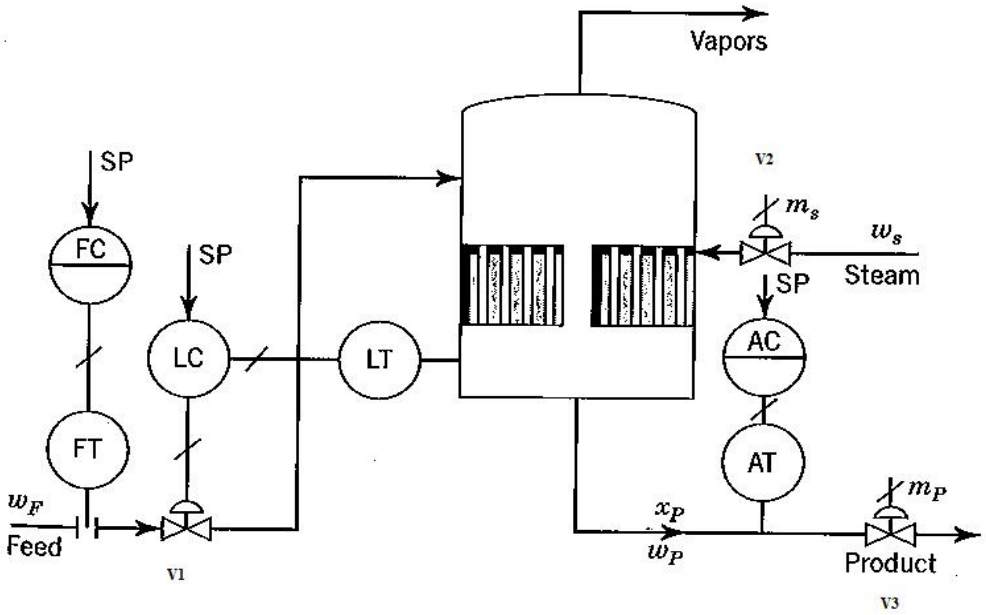
Time: Three Hours **Maximum Marks: 100**

Answer all the Questions: -
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Explain the Industrial Automation (IA) task and challenges in Industry 4.0.	CO1	[K_2]
2.	Fit-in the six design principles of Industry 4.0 for a power plant.	CO1	[K_2]
3.	Explain the features of IEEE 802.15.4 in the communication Protocol standards used in IoT.	CO2	[K_2]
4.	Explain the analogy and goal of IoT networking.	CO2	[K_2]
5.	Explain Augmented Reality net impact in process industry and configure its hardware modules.	CO2	[K_2]
6.	What makes data integration being a major challenge in IIoT?	CO3	[K_2]
7.	What are the three critical key elements in building the industrial internet for process industry?	CO3	[K_2]
8.	Classify the difference between fog and edge computation in IIoT platform.	CO4	[K_2]
9.	What are the requirements in the Properties and features for Data Center Network?	CO3	[K_2]
10.	Draw the design philosophy of IIoT for industrial processes.	CO4	[K_2]

Answer any FIVE Questions: -
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a.	Explain the different types of network topology used in IoT.	8	CO1	[K3]
	b.	Explain the features of 6LoWPAN Communication Protocol.	8	CO1	[K3]
12.		For a Smart Building Automation using Z-wave Protocol Write a brief note with technology aspect only (Point by point) on the following: • Home Area Network (HAN) • Smart Home Security System • Smart Home Wireless Protocol • Z-WAVE TECHNOLOGY • OSI- Discuss on the different Layers	16	CO2	[K3]
13.		In the evaporator shown in the **Fig below**, the product composition, Xp, and feed flow, Wf, are to be controlled by manipulating the signals to the control valves on the steam and product lines, Ms and Mp. As shown in the diagram, although there is a control valve on the feed line, this valve must control the level in the evaporator (LC). This is because the feed is the largest of the three flows in the system and thus the greatest influence on the level. The level in a calandria-type evaporator must be controlled very tightly because it has great influence on the heat transfer rate.	16	CO3	[K4]



Derive the Cloud-Based IIoT Architecture for the evaporator unit operation plant. Also name three Industrial Cloud Platform Providers.

14.	a)	Develop a platform for designing Cyber Physical System-based manufacturing systems for Industry 4.0	8	CO2	[K_3]
	b)	Explain the variant features of ProfiBus applied in process industries.	8	CO1	[K_2]
15.	a)	Derive the three-tier architecture pattern applied in IIRA for a hydro power plant process industry.	8	CO4	[K_3]
	b)	What is SDN? Draw the SDN architecture and what does separating control and data plane means?	8	CO3	[K_2]
16.		Develop an application of Machine Learning Algorithm for inspection and operation analysis of a machine operation forecast on a cloud platform. Give detailing of the following: • Define the objective to design • Data gathering procedure • Preparing Data • Exploring Data Analysis • Building a Machine Learning Model • Model evaluation & Optimizations • Prediction	16	CO4	[K_3]

****