Roll No.											

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 23-12-2025 **Time:** 09:30am – 12:30pm

School: SOCSE	**Program:** B. Tech IoT	
Course Code: CIT2400	**Course Name:** Cyber-Physical Systems	
Semester: III	**Max Marks**:100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	26	24	24	26	-

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M

1.	What does the term "IIoT" stand for?	2 Marks	L1	CO1
2.	List one key recommendation for CPS design.	2 Marks	L1	CO1
3.	Explain how a CPS creates a feedback loop between the computational and physical elements.	2 Marks	L2	CO1
4.	Name one common wireless technology used in CPS.	2 Marks	L1	CO2
5.	How does a hybrid system differ from a purely continuous or discrete system?	2 Marks	L2	CO2
6.	What is the primary characteristic of a synchronous reactive model?	2 Marks	L1	CO3
7.	Compare the data-driven nature of dataflow models with the time-driven nature of synchronous models.	2 Marks	L2	CO3
8.	Define 'data privacy' in the context of a CPS.	2 Marks	L1	CO4
9.	Explain why internet-wide secure communication is challenging to implement.	2 Marks	L2	CO4
10.	Propose a simple security measure for a home automation CPS to prevent unauthorized access.	2 Marks	L3	CO4

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	List and describe the four main components that typically constitute a Cyber Physical System in the real world.	**10 Marks**	**L1**	**CO1**
	b.	Summarize the impact of Industry 4.0 on modern manufacturing processes.	**5 Marks**	**L1**	**CO1**
	c.	Identify two non-functional requirements (e.g., reliability, safety) critical for a medical CPS.	**5 Marks**	**L1**	**CO1**
Or					
12.	**a.**	Enumerate the stages involved in the development lifecycle of a CPS, from concept to deployment.	**10 Marks**	**L1**	**CO1**
	b.	Outline the key takeaways from a case study on CPS in autonomous vehicles.	**5 Marks**	**L1**	**CO1**
	c.	Name one societal benefit and one challenge posed by the widespread adoption of CPS.	**5 Marks**	**L1**	**CO1**

13.	**a.**	Compare the functionality of sensors and actuators in a CPS, providing a concrete example of their interaction.	**10 Marks**	**L2**	**CO2**
	b.	Classify the dynamics of a traffic light control system and explain your reasoning.	**5 Marks**	**L2**	**CO2**
	c.	Illustrate the concept of 'state' in the context of discrete dynamics.	**5 Marks**	**L2**	**CO2**
Or					
14.	**a.**	Explain the trade-offs involved in selecting a wireless technology (e.g., Zigbee vs. LoRaWAN) for a large-scale agricultural CPS.	**10 Marks**	**L2**	**CO2**
	b.	Interpret a simple continuous dynamic model, such as a model of a car's cruise control system.	**5 Marks**	**L2**	**CO2**
	c.	Select an appropriate microcontroller for a low-power, sensor-based CPS node and justify your selection.	**5 Marks**	**L2**	**CO2**

15.	**a.**	Analyze the suitability of the dataflow model of computation for signal processing applications in CPS.	**10 Marks**	**L3**	**CO3**
	b.	Demonstrate the concept of logical time and ticks in a synchronous reactive model.	**5 Marks**	**L3**	**CO3**
	c.	Differentiate between the architecture of a standalone embedded system and an IoT device connected to the cloud.	**5 Marks**	**L3**	**CO3**

Or					
16.	**a.**	Describe the process of multitasking and the role of a scheduler in an embedded system's Real-Time Operating System (RTOS).	**10 Marks**	**L3**	**CO3**
	b.	Explain how a timed model of computation can be used to simulate the behavior of a real-time system.	**5 Marks**	**L3**	**CO3**
	c.	Categorize a smartwatch as an Embedded System, an IoT device, or a CPS and justify your classification.	**5 Marks**	**L3**	**CO3**

17.	**a.**	Compare the threats associated with local network security and cloud security for a CPS.	**10 Marks**	**L2**	**CO4**
	b.	Illustrate how a denial-of-service (DoS) attack could disrupt a critical infrastructure CPS.	**5 Marks**	**L2**	**CO4**
	c.	Suggest two methods to ensure secure boot and firmware updates in a CPS device.	**5 Marks**	**L2**	**CO4**
Or					
18.	**a.**	Discuss the role of encryption and authentication in ensuring internet-wide secure communication for CPS.	**10 Marks**	**L2**	**CO4**
	b.	Apply a threat modeling technique (like STRIDE) to a simple CPS example, such as a connected car.	**5 Marks**	**L2**	**CO4**
	c.	Identify a privacy risk associated with data collected by a CPS in a smart city and a way to mitigate it.	**5 Marks**	**L2**	**CO4**