



Roll No.														
----------	--	--	--	--	--	--	--	--	--	--	--	--	--	--

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations - MAY/ JUNE 2025

Date: 02-06-2025

Time: 01:00 pm – 04:00 pm

School: SOCSE	Program: B.Tech - CIT	
Course Code : CSE3177	Course Name: Cyber Physical Systems	
Semester: IV	Max Marks:100	Weightage: 50%

CO - Levels	C01	C02	C03	C04
Marks	26	26	24	24

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.	List two benefits of CPS in manufacturing.	2 Marks	L1	C01
2.	Define system dynamics.	2 Marks	L1	C02
3.	Name two simulation tools used for CPS.	2 Marks	L1	C03
4.	Define insider threat in CPS.	2 Marks	L1	C04
5.	What is the meaning of deterministic behavior in SR models?	2 Marks	L1	C01
6.	List two characteristics of CPS systems.	2 Marks	L1	C02
7.	What is a Data Flow Graph (DFG)?	2 Marks	L1	C03
8.	Define authentication in the context of CPS.	2 Marks	L1	C04
9.	Define interoperability in CPS.	2 Marks	L1	C01
10.	What is the perception layer in IoT?	2 Marks	L1	C02

Part B

Answer the Questions.

Total Marks 80M

11.	a.	Explain the layered architecture of a typical CPS.	10 Marks	L2	C01
Or					
12.	a.	Explain the future trends in CPS.	10 Marks	L2	C01
13.	a.	Illustrate a real-world CPS system and its operational workflow.	10 Marks	L2	C01
Or					
14.	a.	Explain how does CPS contribute to enhanced product development?	10 Marks	L2	C01
15.	a.	Summarize smart agriculture applications using CPS	10 Marks	L2	C02
Or					

16.	a.	Outline a CPS platform design for smart transportation.	10 Marks	L2	C02
17.	a.	Identify the total energy consumed by 20 sensors, each consuming 50 mW, transmitting data every 15 minutes, over one day.	10 Marks	L3	C02
Or					
18.	a.	Identify the necessary bandwidth for a CPS network that must transmit data from 100 sensors, each sending an update every second. Assume each update is 0.5 KB in size	10 Marks	L3	C02
19.	a.	Explain timed models of computation with examples.	10 Marks	L2	C03
Or					
20.	a.	Compare discrete-time, continuous-time, and hybrid models.	10 Marks	L2	C03
21.	a.	<p>A CPS employs a synchronous reactive system where, in every reaction cycle, four tasks must be executed in sequence. The tasks have the following worst-case execution times (WCET):</p> <ul style="list-style-type: none"> Task 1: 2.0 ms Task 2: 3.5 ms Task 3: 1.5 ms Task 4: 2.0 ms <p>Between tasks, due to communication/synchronization overhead, there is a fixed delay of 0.5ms. Determine:</p> <ol style="list-style-type: none"> The worst-case duration of a reaction cycle. Whether a cycle period of 12 ms is feasible. 	10 Marks	L3	C03
Or					
22.	a.	<p>Make use of SDF graph with three nodes: A, B, and C.</p> <ul style="list-style-type: none"> Node A: Produces 4 tokens each time it fires. Node B: Consumes 2 tokens per firing from A's output and produces 6 tokens on its own output. Node C: Consumes 3 tokens per firing from B's output. <p>to find out:</p> <ol style="list-style-type: none"> The minimal steady-state repetition vector $[q_A, q_B, q_C]$. The throughput if the firing time for each node is 2 ms. 	10 Marks	L3	C03
23.	a.	Explain confidentiality, integrity, and availability (CIA triad) in CPS.	10 Marks	L2	C04
Or					
24.	a.	Explain the challenges in Internet-wide communication security.	10 Marks	L2	C04
25.	a.	Illustrate cybersecurity threats in cloud-connected CPS.	10 Marks	L2	C04
Or					
26.	a.	Explain security measures for cloud-interconnected CPSs.	10 Marks	L2	C04