



K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

InSem Examination-II Summer 2025	
Exam Seat No.:	
Academic Year: 2024-2025	Semester: IV
Class: SY	Program: B.Tech
Branch Code: ETC	Pattern: 20
Name of Course: Foundations of Cyber Physical Systems	Course Code: 2302216(A)
Max. Marks: 30	Duration: 1.15 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required but justify it.
4. Draw the neat, labelled diagrams, wherever necessary.
5. The last column indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

Marks CO

Question No. 1

- 1 a) How does a cyber-physical system integrate computing, communication, and control components? What are the key differences (any 2) between traditional embedded systems and cyber-physical systems? (7) CO1

Question No. 2

- 2 a) What role do sensors and actuators play in cyber-physical systems? (8) CO1

OR

- 2 b) How do cyber-physical systems contribute to smart infrastructure development? (8) CO1

Question No. 3

- 3 a) Differentiate between open-loop and closed-loop control strategies in Cyber-Physical Systems. Given the characteristic equation $s^2 + 5s + 6 = 0$, use Routh-Hurwitz criteria to analyze system stability. (7) CO2

Question No. 4

- 4 a) 1) For the system $\frac{dx}{dt} = Ax$, where $A = \begin{bmatrix} 0 & 1 \\ -4 & -3 \end{bmatrix}$, determine the stability by analyzing the eigenvalues of A. (8) CO2
- 2) Compare the stability of a system with poles at -1 and -2 versus a system with poles at 1 and -2 using root locus analysis.

OR

4 b) **How do different network configurations affect system performance?**

(8) CO2

..... End of question paper.....