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Subject Code: BOE094

Roll No:

BTECH

(SEM. VIII) THEORY EXAMINATION 2025-26

COMPUTERIZED PROCESS CONTROL

TIME: 3 HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

2x7 = 14

(a)	Define <i>Computer-Aided Process Control System</i> and list its key elements.	CO-1	K1
(b)	Explain any two <i>data transfer techniques</i> used in industrial communication systems.	CO-2	K2
(c)	Explain the difference between <i>physical model</i> and <i>control model</i> with suitable examples.	CO-3	K3
(d)	Explain the concept of <i>adaptive control</i> and how it differs from conventional control methods.	CO-4	K2
(e)	Explain the working principle of <i>electric oven temperature control</i> using computerized process control.	CO-5	K2
(f)	Define <i>process model</i> and list different types of models used in process control.	CO-3	K1
(g)	Differentiate between <i>Analog Interfaces</i> and <i>Digital Interfaces</i> used in process control systems.	CO-1	K2

SECTION B

2. Attempt any three of the following:

7 x 3 = 21

(a)	Explain the architecture of a <i>Computer-Aided Process Control System</i> . Discuss centralized, distributed, and hierarchical control systems with suitable diagrams.	CO-1	K3
(b)	Describe the structure and working of <i>industrial communication networks</i> . Explain different types of network topologies used in process control systems.	CO-2	K3
(c)	Explain the concept of <i>process modelling</i> and describe the need for modelling in computerized process control systems.	CO-3	K3
(d)	Evaluate the effectiveness of advanced control strategies in improving system performance. Justify which strategy is most suitable for complex industrial processes.	CO-4	K5
(e)	Analyze the <i>thickness and flatness control system</i> in metal rolling using computerized process control techniques.	CO-5	K4

SECTION C

3. Attempt any one part of the following:

7 x 1 = 7

(a)	Analyze the role of computers in process control. Explain the benefits and economic considerations of implementing computer-aided process control systems.	CO-1	K4
(b)	Evaluate following types of process-related interfaces and justify their selection in an industrial control system. (i) Analog interfaces (ii) Digital interfaces (iii) Pulse interfaces (iv) Standard interfaces	CO-1	K5

4. Attempt any one part of the following:

7 x 1 = 7

(a)	Analyze the role of <i>real-time operating systems</i> in computerized process control. How do they differ from general-purpose operating systems?	CO-2	K4
(b)	Evaluate different types of <i>computer-aided process control software</i> . Justify their suitability for industrial applications.	CO-2	K5

5. Attempt any one part of the following:

7 x 1 = 7

(a)	Analyze the steps involved in the <i>modelling procedure</i> . Also includes its goals definition, information preparation, model formulation, and solution finding.	CO-3	K4
(b)	Evaluate the importance of <i>model validation and results analysis</i> in process modelling. How do they ensure accuracy and reliability of the model?	CO-3	K5

6. Attempt any one part of the following:

7 x 1 = 7

(a)	Describe the working principle of <i>predictive control</i> . How is it applied in computerized process control systems?	CO-4	K3
(b)	Analyze different advanced control strategies (<i>inferential control, intelligent control, and statistical control</i>). Compare their features and applications.	CO-4	K4

7. Attempt any one part of the following:

7 x 1 = 7

(a)	Evaluate the role of computerized process control in <i>electric power generation plants</i> . Discuss its impact on efficiency, safety, and reliability.	CO-5	K5
(b)	Describe the computerized control of a <i>reheat furnace temperature system</i> . Explain its components and working.	CO-5	K3