

Roll No.

Total Pages : 3

009601

August/September 2022

B.Tech. (EIC) VI SEMESTER

Industrial Process Control (EI-601)

Time : 3 Hours]

[Max. Marks : 75

Instructions :

1. *It is compulsory to answer all the questions (1.5 marks each) of Part-A in short.*
2. *Answer any four questions from Part-B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*

PART-A

1. (a) What is the difference between manipulated variable and control variable? (1.5)
- (b) What is the deviation variable? (1.5)
- (c) What is the name of dead-time compensation technique? (1.5)
- (d) Identify the functions and hardware components of a computer-process control. (1.5)
- (e) Give 02 examples of ratio control. (1.5)

009601/100/111/365

236 [P.T.O.]

- (f) Draw feed-forward control configurations for the mixing process. (1.5)
- (g) What is the most evident type of second order system available in daily routine? (1.5)
- (h) How do we select the best values for the adjustable parameters of a feedback controller? (1.5)
- (i) Write the equation of mass balance on component A. (Note : The principle of conservation has to be considered.) (1.5)
- (j) What does mean by servo problem? Use block diagram to explain. (1.5)

PART-B

- 2. (a) While driving a bicycle, what are your control objective, your measurement, and the manipulated variable at your disposal? (5)
- (b) What is the use of mathematical modelling? Give the mathematical modelling of a Continuous stirred tank reactor. (10)
- 3. (a) Explain the physical significance of two parameters τ and ξ of the second order system. (5)
- (b) Where do we use the Process reaction-curve method? Explain the relevancy. (5)
- (c) Explain the linearization process of one variable by a suitable example. (5)

- 4. (a) Integral control action makes a process (i) Faster or Slower; (ii) more oscillatory or less; (iii) with large deviation from the set point or smaller. Explain. (9)
- (b) Explain the Time-Integral Performance Criteria. (6)
- 5. (a) Draw the feedforward and feedback control system that regulates the flow through a pipe. Do you expect one of them to be significantly better than the other in maintaining the desired flow? (10)
- (b) Are the outer loops in the MRAC and STR configurations of feedforward or feedback nature? Defend your belief on it. (5)
- 6. What are the properties of a relative-gain array? How many relative gains do you need to compute in order to specify completely the relative-gain array of a process with (i) three inputs and three outputs, and (ii) N inputs and N outputs? (15)
- 7. What size computers would you use for DDC and supervisory control? Why? How do the DDCs communicate with the supervising computer? (15)