53 (IE 601) PRCN

2017

PROCESS CONTROL

Paper : IE 601

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions out of **seven**.*

1. *(a)* What is the need for mathematical modeling for process control? Obtain the mathematical model for first order thermal process. 10

(b) For the level process shown in *Figure : 1*, derive the transfer function, $H_2(s)/Q(s)$. 10

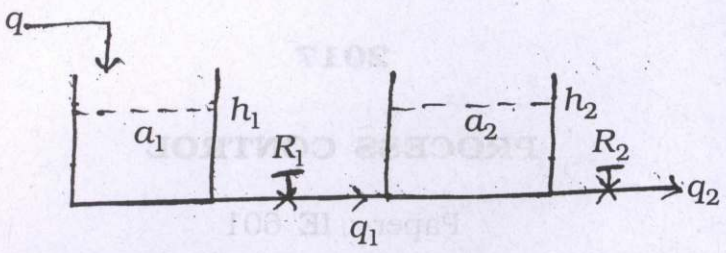

Figure : 1

$h_1 = 2{\cdot}5m$, $h_2 = 2m$, $q = 40 lit/min$,

$C_1 = 1{\cdot}5m^2$, and $C_2 = 1{\cdot}2m^2$.

2. Explain in detail with the help of block diagrams, the operations of the following Control schemes : 20

   (i) Cascade Control

   (ii) Ratio Control.

3. (a) Compare the features of ON-OFF, P, I and D control modes. Also draw their characteristics. 10

   (b) Describe open loop method of tuning the PID controller. 10

4. *(a)* Explain the various time integral performance criteria with closed loop response. 14

(b) Differentiate servo and regulatory operation with the help of suitable example. 6

5. *(a)* Explain Feedforward Control strategy for a typical process. 10

(b) How many types of Selective Control Systems are available ? Explain *any one* type of Selective Control System. 10

6. *(a)* Give *two* examples of Elective actuators. 10

(b) Discuss about the important factors before selecting *(i)* air to close and *(ii)* air-to-open pneumatic control valve. 10

7. Write short notes on the following : 4×5=20

(i) Dryer

(ii) Heat exchanger

(iii) Binary distillation

(iv) Mixing.
