2017

PROCESS INSTRUMENTATION AND CONTROL

Paper : IE 605

Full Marks : 100

Time : Three hours

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

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

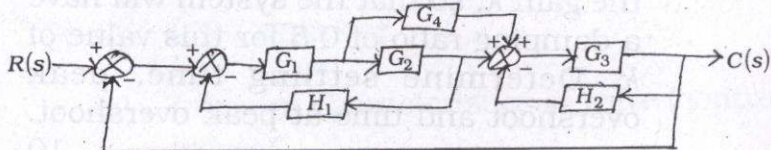1. (a) Using block diagram reduction technique. Find $C(s)/R(s)$.

   10

Fig : 01

   (b) Find the overall gain for the above system *(Fig : 01)* using signal Flow graph method.   10

2. (a) Design the complete block diagram and obtain the transfer function $H_2(s)/Q_i(s)$. **10**
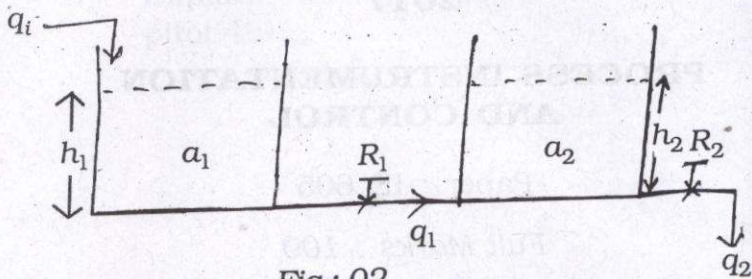

Fig : 02

(b) Design and derive the gain of pneumatic PID controller.

10

3. (a) The Unity Feedback System is characterized by an open loop transfer function $G(s) = k/s(s+10)$. Determine the gain k, so that the system will have a damping ratio of 0·5 for this value of k. Determine settling time, peak overshoot and time at peak overshoot.
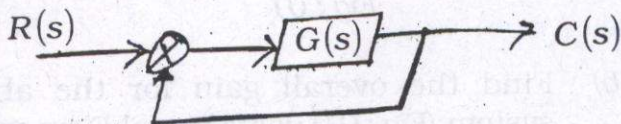
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Fig : 03 Unity Feedback System

(b) Using Routh criterion, determine the stability of the system represented by the characteristic equation, $s^4 + 8s^3 + 18s^2 + 16s + 5 = 0$. Comment on the location of the roots of characteristic equation.

10

4. *(a)* What are the Functional blocks of an instrumentation system and explain with suitable example ?

12

(b) What are the points to be considered for selection of a transducer and explain it ?

8

5. Write short notes on the following :

10×2=20

(i) I/P Converter

(ii) Inherent characteristics of valve (control valves)

6. Discuss *any two* methods for level and flow measurement with neat diagram.

20

7. *(a)* Explain the principle and operation of thermocouple with the help of neat sketch.　　10

　(b) Explain how to calculate flow using pitot tube.　　10