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Question Paper Code : 51536

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Sixth Semester

Electronics and Instrumentation Engineering

EI 2352/EI 62/10133 EI 602 – PROCESS CONTROL

(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

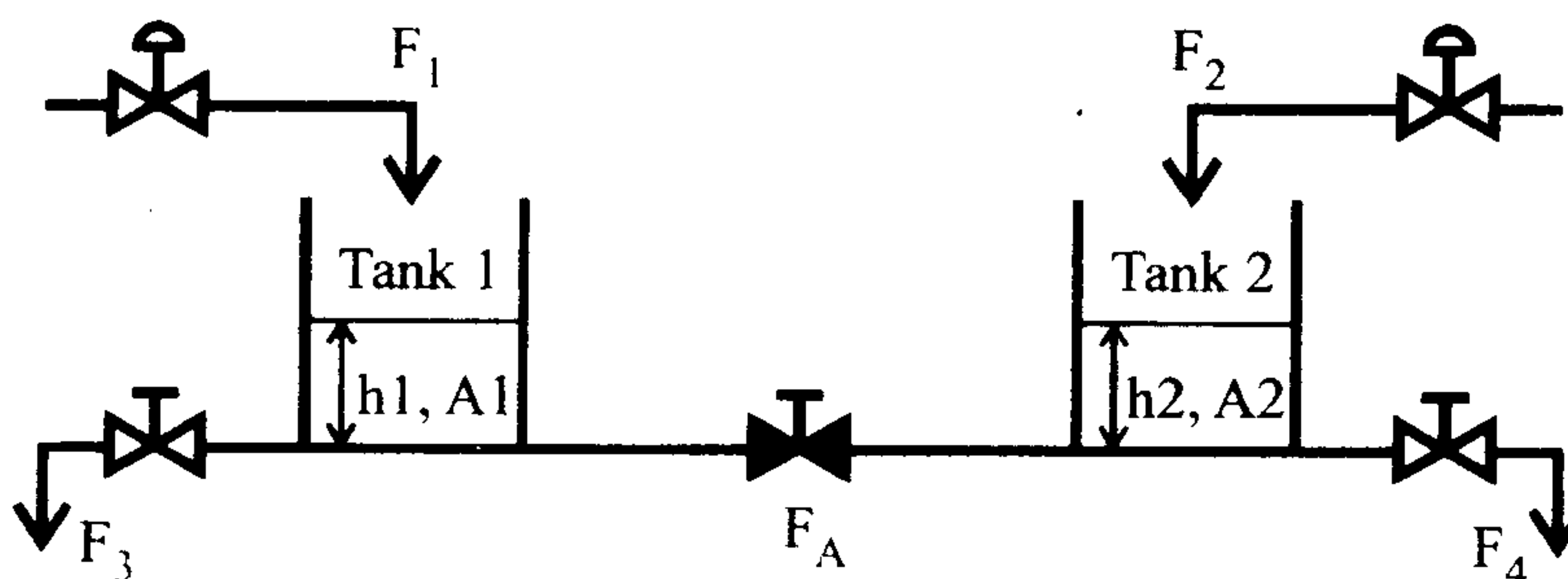
PART – A (10 × 2 = 20 Marks)

1. Any process can exhibit self regulation, Yes/no. Justify.
2. What is degrees of freedom ?
3. Write the advantages of I and D control actions.
4. Design an electronic ON-OFF controller, which provides an output of 5 V, when the temperature measured by a J-type thermocouple is equal to or greater than 250 °C. Otherwise the controller output should be 0 V. The sensitivity of the thermocouple is 40 μ V/ °C. Also draw the circuit diagram.
5. Define one quarter decay ratio.
6. What performance criterion should be used for the selection and tuning of controller ?
7. How to select secondary controller in a cascade control scheme ?
8. Identify the input and output variables of distillation column.

9. What is meant by cavitation ?
10. What are the uses of control valve positioners ?

PART – B (5 × 16 = 80 Marks)

11. (a) Obtain the material balance equation for the two-tank hybrid system shown below and determine the transfer functions $h_1(s) / F_1(s)$ and $h_2(s) / F_2(s)$. (16)



OR

- (b) (i) Derive transfer function of single tank liquid level system. Draw a suitable sketch. (8)
- (ii) Discuss in detail about servo and regulatory operations. (8)
12. (a) (i) With neat schematic diagram, explain the single speed floating control. (6)
- (ii) With neat sketch, explain the working of P + I pneumatic controller. (10)

OR

- (b) Explain, with a neat circuit diagram, the working of electronic PID controller. (16)
13. (a) (i) How is ITAE criterion different from IAE ? (6)
- (ii) In an application of the Zeigler – Nichols method, a process begins oscillation with a 30% proportional band in an 11.5 min period. Find the nominal three mode controller settings. (10)

OR

- (b) (i) Write short notes on the various performance evaluation criteria. (8)
- (ii) Describe the Ziegler-Nichols closed loop method of controller tuning. (8)

14. (a) Explain the three element control in boilers. (16)

OR

(b) (i) What is split range control ? Explain a simple application, where it is used. (8)

(ii) Explain the implementation of ratio control, for a blending process. (8)

15. (a) (i) With a neat diagram, explain the functioning of a valve positioner. What are the advantages of using the same ? (10)

(ii) Explain the working of a simple current to pressure converter, with a neat diagram. (6)

OR

(b) (i) Explain cavitation and flashing in control valves. (6)

(ii) Explain sizing of control valves. (10)