Enrollment No. _____

Shree Manibhai Virani and Smt. Navalben Virani Science College (Autonomous), Rajkot

Affiliated to Saurashtra University, Rajkot

SEMESTER END EXAMINATION APRIL - 2018

M. Sc. Industrial Chemistry

16PICCC16 - PROCESS DYNAMICS & CONTROL

Duration of Exam – 3 hrs ***Semester – IV*** ***Max. Marks – 70***

***Part A** (5x2= 10 marks)*

Answer **ALL** questions

1. Which of the following is correct:

(A) Offset	i) Desired property of control system.
(B) Error	ii) Undesired property of control system.

a) (A) (i) (B) (i)
b) (A) (ii) (B) (ii)
c) (A) (i) (B) (ii)
d) (A) (ii) (B) (i)

2. Write mathematical equation for Derivative control.

3. What do you mean by the term Laplace Transform?

4. Draw only labelled diagram of 1st order Thermometer system.

5. Give full form of: i) LVDT ii) RVDT.

***Part B** (5x5= 25 marks)*

Answer **ALL** questions

6a. Give comparison between open loop control system and closed loop control system.

OR

6b. Write a brief note on degree of freedom analysis.

7a. Explain pressure-to-open control valve with neat diagram.

OR

7b. Explain pressure-to-close control valve with neat diagram.

8a. Derive Laplace transform of f(t) = 1.

OR

8b. Find Laplace transform of f(t) = 4 $\frac{dx}{dt} + 5$.

9a. A tank having time constant 1 minute operating at a steady state with inlet flow rate 20 m^3/min. If the flow rate is increased to 100 m^3/min. Find the value of head in the tank after:

i) 0.5 min
ii) 1.0 min
iii) 1.5 min
iv) 2.0 min
v) 2.5 min

Tabulate your answers.

OR

9b. A thermometer is kept in a ice-bath at 280K, if a step change is given by maintaining a temperature of bath at 288K. Given the time constant for thermometer is 1 min. Calculate the thermometer reading after:

i) 1.0 min
ii) 1.5 min
iii) 2.0 min
iv) 2.5 min
v) 3.0 min

Tabulate your answers.

10a. Write a note on control valve sizing.

OR

10b. Write a note on:

i) Linear valve characteristics.
ii) Non-linear valve characteristics.

***Part C** (5x7= 35 marks)*

Answer **ALL** questions

11a. Define transportation lag. Explain reasons for transportation lag with suitable diagram.

OR

11b. Explain with diagram of a heating system with manual control system. Give its advantages and disadvantages.

12a. Explain in detailed note with a neat diagram working of control valve used for controlling temperature in a heat exchanger.

OR

12b. Explain with the help of a neat graph, motivation for addition of control action modes.

13a. Write a note on the following standard process input:

i) Step input.
ii) Exponential input.

OR

13b. Write a note on the following standard process input:

i) Ramp input.
ii) Rectangular input.

14a. Derive an equation of transfer function for interacting tanks with the help of neat diagram.

OR

14b. Derive an equation of transfer function for non-interacting tanks with the help of neat diagram.

15a. Explain in detail cascade control system.

OR

15b. Explain in detail Feed forward control system.

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