

CM-604 (GS)

B.E. VI Semester Examination, June 2020

Grading System (GS)

Chemical Process Control

Time : Three Hours

Maximum Marks : 70

- Note:** i) Attempt any five questions.
ii) All questions carry equal marks.

1. Piping designation in the form : DIAM-FLU-MATL-XXX. What is the meaning of DIAM, FLU, MATL and XXX?
2. Sketch the transient response characteristics of
 - i) a bare thermocouple
 - ii) a shielded thermocouple.Draw electrical analogies for these two devices.
3. Define Principles of Pneumatic Systems. Explain with neat sketches the working of electronic control systems for control of liquid level and flow.

4. Using Laplace transforms, solve the following sets of linear differential equations

$$\frac{dy_1}{dt} - \frac{2dy_2}{dt} = 1 - y_1 + y_2, \quad y_1(0) = 1$$

$$\frac{3dy_1}{dt} + \frac{dy_2}{dt} = y_2 - e^{-t}, \quad y_2(0) = 2$$

5. Determine the range of k for stability of the system with following characteristic equation $s^4 + ks^3 + s^2 + s + 1 = 0$.
6. Explain Instrumentation scheme for composition control of Top and Bottoms in Distillation column.
7. What performance criterion should be used for the selection and tuning of controller? Write Ziegler-Nicolas tuning formulae.
8. Check whether $H(s) = N(s)/D(s)$ has all its poles on the open left half plane.

$$D(s) = s^7 + 3s^6 + 3s^5 + s^4 + s^3 + 3s^2 + 3s + 1$$
