

Code: 9A10602

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016

PROCESS CONTROL INSTRUMENTATION

(Common to EIE & E.Con.E)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) For a flow head equation $q = hn$, calculate the resistance.
(b) A liquid storage device is spherical in shape. Calculate the capacitance as a function of load.
(c) If the outflow of vessel is proportional to the square root of the head, what is the shape of vessel resulting at a steady change in head?
- 2 In a jacketed tank, the temperature of a process steam θ_1 is preheated to a temperature θ_2 by means of steam with temperature θ_s through the jacket. Assume that the capacity of the tank wall is negligible and temperature inside the jacket is uniform.
(a) Derive the transfer function of this system to study the temperature response if the rate of flow of process steam is constant.
(b) Make correction in the transfer function if the rate of flow of the process steam is also variable. Also discuss about the time constants for a high flow rate and a low flow rate.
- 3 Describe the stability of exothermic reactors in detail.
- 4 Explain about different measurements liquid level, fluid flow and temperature.
- 5 (a) Discuss relative advantages and disadvantages of proportional, integral and derivative actions.
(b) Explain about the effect of proportional control action on the closed loop response of process.
- 6 (a) Describe about the realization of pneumatic proportional controller with a neat sketch.
(b) Derive the expression for the output voltage of an electronic PID controller with a neat sketch.
- 7 Explain about the process of nuclear power plant with a detailed diagram.
- 8 (a) Explain cascade control action. What are its limitations?
(b) Draw sliding stem control valves and list its applications.
