MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (CHEMICAL ENGINEERING) MAKE UP EXAMINATIONS, JUNE 2019

SUBJECT: PROCESS DYNAMICS AND CONTROL [CHE3203]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

	Instructions to Candidates:
*	Answer ALL questions.
*	Use of linear graph sheet is permitted.
*	Missing data may be suitably assumed.

1A	Explain the different variables used to describe the process to design a feedback control scheme.	02
1B	Define the Initial value and Final value theorems and discuss their importance in control system.	
1C	The following transfer function is not written in the standard form.	
	$G(s) = \frac{2(s+0.5)}{(s+2)(2s+1)}e^{-5s}$ (a) Put it in standard gain/time constant form	
	(b) Determine the gain, poles and zeros	
2A	Consider the Laplace transform of the function x(t) as,	04
	$\overline{x}(s) = \frac{s^2 - s - 6}{(s - 1)(s + 1)(s - 2)}$	
	Find its x(t) using inverse Laplace transform.	
28	Develop a transfer function model from given state-space model $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -1.25 & -0.5 \\ -0.5 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} u(t); y = \begin{bmatrix} 1.25 & 0.5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$	02
2C	Distinguish between bounded and unbounded inputs. State their time domain and Laplace domain functions	04
3 A	Define the different terminology (with governing equation) used to describe the second order underdamped system response for step input.	04
38	A thermometer assumed to first order dynamics with a time constant of 1 min is placed in a temperature bath at 100 0 C. After the thermometer reaches steady state, it is suddenly placed in a bath at 110 0 C at t = 0 and left there for 1 min, after which it is immediately returned to the bath at 100 0 C. Calculate the thermometer reading at t = 0.5 min and at t = 2.0 min.	04


