University of Mumbai
Online Examination 2020

Program: BE Chemical Engineering

Curriculum Scheme: Revised 2016

Examination: Fourth Year Semester VII

Course Code: CHC703

Course Name: Process Dynamics and Control

Time: 1 hour | Max. Marks: 50

Note to the students:- All Questions are compulsory and carry equal marks .

Q1.	The process variables that can be adjusted in order to keep the controlled variables at or near their set points
Option A:	Manipulated variable
Option B:	Controlled variable
Option C:	Disturbance variable
Option D:	Load variable
Q2.	For a proportional controller the controller output will be proportional to
Option A:	Load variable
Option B:	Measured variable value
Option C:	Disturbance value
Option D:	Deviation from the set point
Q3.	If the disturbance variable is measured, the control strategy is called as
Option A:	Feedback control
Option B:	Feed forward control
Option C:	Inferential control

Option D:	Cascade control
Q4.	A stirred-tank blending process with a constant liquid holdup of 2 m3 is used to blend two streams whose densities are both approximately 900 kg/m3. The density does not change during mixing. Assume that the process has been operating for a long period of time with flow rates of w1 = 500 kg/min and w2 = 200 kg/min, and feed compositions (mass fractions) of x1 = 0.4 and x2 = 0.75. What is the steady-state value of x?
Option A:	0.5
Option B:	1
Option C:	0.8
Option D:	0.3
Q5.	Time constant of Transportation lag is
Option A:	$e^{-\tau s}$
Option B:	$e^{\tau s}$
Option C:	$1+ e^{-\tau s}$
Option D:	$1-e^{-\tau s}$
Q6.	Transfer function of two tank interacting system relating height of liquid in second tank to inlet flow to first tank, where τ_1 and τ_2 are time constants of first and second tanks respectively and R_1 and R_2 are resistances of outlet valve of first and second tanks respectively.
Option A:	$H_2(s)/Q(s) = R_2/[\tau_1 \tau_2 s^2 + (\tau_1 + \tau_2)s +1]$
Option B:	$H_2(s)/Q(s) = R_2/[\tau_1 \tau_2 s^2 + (\tau_1 + \tau_2 + A_1R_2)s +1]$
Option C:	$H_2(s)/Q(s) = R_1/[\tau_1 \tau_2 s^2 + (\tau_1 + \tau_2 + A_1R_2)s +1]$
Option D:	$H_2(s)/Q(s) = R_1/[\tau_1 \tau_2 s^2 + (\tau_1 + \tau_2)s +1]$
Q7.	A linear system at rest is subject to an input signal $R(t)=1-e^{-2t}$. The response of the system for t >0 is given by $C(t)=1-e^{-3t}$. The transfer function of the

	system is:
Option A:	3(s+2)/2(s+3)
Option B:	(s+2)/(s+3)
Option C:	2(s+3)/(s+2)
Option D:	(s+3)/2(s+2)
Q8.	For a second order under damped step response, Decay ratio is
Option A:	1/ Over shoot
Option B:	$(\text{Overshoot})^{1/2}$
Option C:	$(\text{Over shoot})^{2}$
Option D:	$1/(\text{Overshoot})^{2}$
Q9.	If two tanks are connected in series in interacting manner, the transfer function relating the output of second tank to the input to first tank is of --------- order.
Option A:	zero order
Option B:	first order
Option C:	second order
Option D:	third order
Q10.	For undamped second order response, damping coefficient (ξ) is
Option A:	equal to1
Option B:	greater than 1
Option C:	less than 1
Option D:	Equal to 0
Q11.	In Regulator problem,

Option A:	Load is variable but set point is constant
Option B:	Load is constant but set point is variable
Option C:	Load and set point, both are constants
Option D:	Load and set point, both are variables
Q12.	In proportional control, offset is defined as
Option A:	Steady state error in manipulated variable
Option B:	unsteady state error in controlled variable
Option C:	unsteady state error in manipulated variable
Option D:	Steady state error in controlled variable
Q13.	Control which is suitable economically if no offset and no oscillations is tolerable
Option A:	Proportional integral control
Option B:	Proportional control
Option C:	Proportional derivative control
Option D:	Proportional integral derivative control
Q14.	Transfer function for a Proportional Derivative controller is
Option A:	$P(s)/\epsilon(s) = Kc[1+1/(\tau_D s)]$
Option B:	$P(s)/\epsilon(s) = Kc[1+ \tau_D s]$
Option C:	$P(s)/\epsilon(s) = Kc[1-1/(\tau_D s)]$
Option D:	$P(s)/\epsilon(s) = Kc[1- \tau_D s]$
Q15.	Amplitude Ratio of time lag is
Option A:	0

Option B:	1
Option C:	∞
Option D:	-1
Q16.	Bode diagram are generated from output response of system subjected to which of the following input?
Option A:	Impulse
Option B:	Step
Option C:	Sinusoidal
Option D:	Ramp
Q17.	The bode plot of the system gives values of Gain Margin (GM) is 20 decibel and Phase margin (PM) is 39^o, then the respective system is……
Option A:	stable
Option B:	unstable
Option C:	oscillatory
Option D:	oscillatory with high amplitude
Q18.	For Complex model which modelling technique is mostly preferred?
Option A:	Theoretical Modelling
Option B:	Empirical Modelling
Option C:	Stochastic Modelling
Option D:	Rigorous Modelling
Q19.	Regression provides unique solution for the model parameters if?
Option A:	Number of data points is equal to number of model parameters
Option B:	Number of data points is more the number of model parameters
Option C:	Number of data points is less than the number of model parameters

Option D:	Number of data points is square the number of model parameters
Q20.	Bode diagram is plot of
Option A:	log (AR) vs. log(ω) and log (ϕ) vs. log (ω)
Option B:	log (AR) vs. (ω) and log (ϕ) vs. (ω)
Option C:	(AR) vs. log (ω) and (ϕ) vs. (ω)
Option D:	log (AR) vs. log (ω) and (ϕ) vs. log (ω)
Q21.	The ISE criterion is used when?
Option A:	large errors are present
Option B:	small errors are present
Option C:	long persiting error
Option D:	weighted error are present
Q22.	If the process of interest can be approximated by a first-order or second-order linear model, the model parameters can be obtained by inspection of
Option A:	Process Reaction Curve
Option B:	Process Intensification
Option C:	Process Linearization
Option D:	Process Curve
Q23.	Amplitude Ratio for 1st and 2nd order system is
Option A:	>1
Option B:	< 1
Option C:	= 1
Option D:	= 0

Q24.	Disadvantage of proportional control action is
Option A:	A more oscillatory behavior
Option B:	Greater value of offset
Option C:	More time to control output
Option D:	Unstable response
Q25.	The major disadvantage of the time-delay estimation method is?
Option A:	Locating Point of inflection
Option B:	Slope of noise
Option C:	Time constant
Option D:	Small gain

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Question	**Correct Option** **(Enter either 'A' or 'B' or 'C' or 'D'**
Q1.	A
Q2.	D
Q3.	B
Q4	A
Q5	A
Q6	B
Q7	A
Q8.	C
Q9.	C
Q10.	D
Q11.	A
Q12.	D
Q13.	D
Q14.	B
Q15.	B

Q16.	C
Q17.	A
Q18.	B
Q19.	A
Q20.	D
Q21.	A
Q22.	A
Q23.	B
Q24.	B
Q25.	A