University of Mumbai

Examination 2021 under cluster __

Examinations Commencing from 2nd June 2021 to 14th June 2021

Program: **INSTRUMENTATION ENGG.**

Curriculum Scheme: Rev2016

Examination: TE Semester VI

Course Code: ISC601 and Course Name: Process Instrumentation System

Time: 2 hour Max. Marks: 80

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Ratio control is where:
Option A:	one variable is controlled in proportion to another
Option B:	a “wild flow” variable sets the gain of the controller
Option C:	fuel must be precisely rationed for economy
Option D:	process data is communicated in a digital format
2.	A condition where integral control action drives the output of a controller into saturation is called:
Option A:	self-bias
Option B:	Offset
Option C:	wind-up
Option D:	Repeat
3.	A proportional band setting of 175% is equivalent to a gain setting of
Option A:	175
Option B:	0.756
Option C:	0.571
Option D:	1.32
4.	The overshoot and settling time are maximum with:
Option A:	Without damping
Option B:	Under damped
Option C:	Over damped
Option D:	Critically damped
5.	Time taken for the response to raise from zero to 100 % for very first time is called…
Option A:	Rise time
Option B:	Settling time
Option C:	Peak time
Option D:	Delay time
6.	What performance criteria from the following should we use for the selection and the tuning of controller.
Option A:	Keep the maximum deviation (error) as small as possible.
Option B:	Keep the maximum deviation (error) constant.
Option C:	Keep the maximum deviation (error) as large as possible.

Option D:	Keep the maximum deviation (error) negative
7.	In a pneumatic PI controller, the sustained error will result in
Option A:	Fixed offset
Option B:	Wind-up
Option C:	Delay
Option D:	Temporary variations in proportional band
8.	The quarter-amplitude decay ratio is basically a design criteria specified by Zeigler-Nichols method implies that the amplitude of an oscillation must be reduced by a factor of _____.
Option A:	Four over a half period
Option B:	Four over a whole period
Option C:	Four over a quarter and a half period
Option D:	Four over a quarter period
9.	Which of the following controller is also known as anticipatory controller?
Option A:	proportional controller
Option B:	Integral controller
Option C:	Derivative controller
Option D:	ON-OFF controller
10.	Which of the following is true about the feedforward control?
Option A:	Cannot make corrections until a measurable error exists.
Option B:	Makes change in output that is the integrated error.
Option C:	Requires the little knowledge of the process before the installation.
Option D:	Is theoretically capable of perfect control.
11.	For fine tuning of cascade control, you should first:
Option A:	Place the secondary controller on manual and adjust the primary controller
Option B:	Place both controllers on automatic and go through the conventional adjustment routine
Option C:	Bypass the secondary controller and adjust the primary controller by the conventional method
Option D:	Place the primary controller on manual and adjust the secondary controller
12.	_____ is the foundation of adaptive control.
Option A:	Parameter estimation
Option B:	Parameter variation
Option C:	Process output variation
Option D:	Variable identification
13.	The ratio control scheme is applicable where
Option A:	Rate of change in wild flow changes.
Option B:	The wild flow is used to set the gain of the controller.
Option C:	One variable is controlled in proportion to another variable.
Option D:	Random variables are measured.
14.	In split range control,
Option A:	Measured signal is divided into multiple signals.

Option B:	Controller output is divided into multiple signal.
Option C:	Controller input is divided.
Option D:	Error signal is split into multiple signal.
15.	Inferential control is nothing but
Option A:	Estimation of process error.
Option B:	Estimation of controlled variable.
Option C:	Estimation of disturbance
Option D:	Estimation of reference signal
16.	Which of the following is true about the relative gain array?
Option A:	It may destabilize the closed loop system
Option B:	Reduced stability margins
Option C:	It is an indication of control loop pairings and measure of interaction
Option D:	It tends to make controller tuning more difficult
17.	Which one of the following justifies the role of decoupler in multivariable systems?
Option A:	It improves the gain
Option B:	It disturbs the stability
Option C:	It increases the control loop interaction
Option D:	It reduces control loop interaction
18.	The capability of convention relay systems for complex operations is _____ that of the PLCs.
Option A:	Poor than
Option B:	As good as
Option C:	Much better than
Option D:	Unpredictable as
19.	Which of the following is not an example of discrete (digital) control.
Option A:	Turning a contactor ON or OFF
Option B:	Turning a lamp ON or OFF
Option C:	Varying the brightness of a lamp
Option D:	Flow control using solenoid valve
20.	For discrete state process control, one of the following is an output device
Option A:	Motor
Option B:	Push button
Option C:	Proximity Sensor
Option D:	Temperature switch

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Describe inverse response behavior of a dynamic process and explain compensation for inverse response behavior in brief?
B	A temperature control system inputs the controlled variable as a range from 0- 4 V. The output is a heater with requiring 0-8 V. A PID is to be used with K_P= 2.4 %/ %, K_I = 9 % per (%min), K_D = 0.7 % per (%min). The period of the faster

	expected change is estimated to be 8s. Develop the PID circuit.
C	What is the need of controller tuning? Explain PRC and Z-N methods for PID tuning in details.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Write short note on following control strategies. 1. cascade control 2. Adaptive control
B	Write short note on: 1. Relative gain array. 2. Multivariable systems and controller tuning.
C	Develop a physical ladder logic diagram for a tank level control system. The water tank is being filled continuously and its level is to be controlled by an ON-OFF drain pump. When level goes above high level the limit pump should be off and if tank level goes below low level, limit pump becomes off. Raise motor fault alarm if occurs.