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SEAT No. _____

SARDAR PATEL UNIVERSITY
T.Y.B.Sc. Examination, FIFTH Semester
Friday, 26TH October 2018
Time : 10.00 am To 1.00 pm
Instrumentation Course Code : US05CINS03
Course Title : Introduction to Control System

Total Marks : 70

Q-1 Write answers to the following multiple choice questions in your answer book by selecting the proper option. [10]

- (1) The tendency of a process to adopt a specific value of controlled variable for nominal load with no control operation is called
 (a) self-motivation (b) self-variation (c) self-adjustment (d) self-regulation
- (2) _____ is a function of the process and not the control system.
 (a) process lag (b) time lag (c) speed lag (d) control lag
- (3) A _____ error indicates a measurement *below* the set point.
 (a) zero (b) negative (c) positive (d) large
- (4) The proportional band is defined by the equation
 (a) $PB = 100 - K_p$ (b) $100 + K_p$ (c) $100 \cdot K_p$ (d) $100/K_p$
- (5) In proportional band offset error reduces to zero if process lag time is ___ and K_p is ____.
 (a) small, large (b) large, small (c) small, zero (d) large, zero
- (6) Water in the control lines do not cause
 (a) corrosion (b) scaling (c) polishing (d) blockage
- (7) The air used in Instrument Air System should not be _____.
 (a) clean (b) dry (c) oil-free (d) humid
- (8) Which of the following is not the criterion for designing of instrument air system?
 (a) sizing criteria (b) valve selection
 (c) pressure level (d) compressor selection
- (9) The ratio of maximum controllable flow to the minimum controllable flow is called valve ____.
 (a) capacity (b) rangeability (c) flexibility (d) controllability
- (10) Quick opening type valves are suitable for systems with _____ pressure drops.
 (a) decreasing (b) increasing (c) constant (d) zero

Q-2 Answer the following questions in brief. (Answer any Ten Questions)

[20]

- (1) Enlist the various process characteristics.
- (2) Give a brief introduction to controllers.
- (3) Write a short note on Transient.
- (4) Write the characteristics of Proportional Control Mode.
- (5) Enlist the characteristics of PI mode.
- (6) Give a brief introduction to composite controller mode.
- (7) Write a short note on sizing criteria.
- (8) Write a short note on air-cooled intercoolers.
- (9) Describe the characteristics of the air used in instrument air systems.

(PTO)

- (10) What are limit switches?
- (11) Define Plug and Seat of a valve.
- (12) Enlist the different types of flow characteristics.

- Q-3 (a) With the help of necessary figure and equation explain about the Two-Position Control Mode. [5]
(b) Discuss the applications of floating control mode in detail. [5]

OR

- Q-3 Draw the block diagram for the error detector and controller, and discuss all the control system parameters in details. [10]

- Q-4 (a) Discuss about the Integral Controller Mode in detail. [5]
(b) Discuss about the Three Mode(PID) Controller. [5]

OR

- Q-4 (a) Explain the Proportional-Integral(PI) Controller Mode in detail. [5]
(b) Discuss in detail about derivative control mode. [5]

- Q-5 (a) Write a note on pressure level and air supply source. [5]
(b) Explain the reciprocating type compressor in detail. [5]

OR

- Q-5 (a) Write a note on sliding vane rotary compressor. [5]
(b) Discuss about screw compressor. [5]

- Q-6 (a) Write a note on split body valve. [5]
(b) Discuss the different types of flow characteristics of a control valve in detail. [5]

OR

- Q-6 (a) Write a note on Valve Rangeability. [5]
(b) Write a note on Valve Capacity. [5]

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