

[70]

SEAT No. _____

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SARDAR PATEL UNIVERSITY
T.Y.B.Sc. Examination, FIFTH Semester
Friday, 15TH November 2019
Time : 10.00 am To 1.00 pm
Applied Physics 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 [10] selecting the proper option.

- (1) In the 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
- (2) The derivative control mode is also known as ____ control.
(a) difference (b) anticipatory (c) reset (d) cumulative
- (3) The air used in the instrument air system should not be ____
(a) clean (b) dry (c) oil-free (d) humid
- (4) The pressure levels used for instrument air systems vary from about ____ psig.
(a) 30 to 40 (b) 40 to 120 (c) 30 to 100 (d) 40 to 100
- (5) Refrigerated air dryers use ____ to cool the air to a lower temperature.
(a) water (b) refrigerant (c) coolant (d) cooling agent
- (6) In a screw compressor, the air flow rate is generally from ____ to ____ scfm.
(a) 400, 1300 (b) 400, 500 (c) 300, 400 (d) 300, 1400
- (7) Two position controller mode is an example of ____ mode.
(a) discontinuous (b) continuous (c) composite (d) multi position
- (8) The deviation or the error of the controlled variable from the set point is given by $e =$ ____
(a) $r+b$ (b) $r \cdot b$ (c) $r - b$ (d) r/b
- (9) In ____ mode a smooth variation of the control parameter is possible
(a) complex (b) composite (c) continuous (d) discontinuous
- (10) The proportional mode can be expressed by the equation $PB =$ ____
(a) $100 - K_p$ (b) $100 + K_p$ (c) $100K_p$ (d) $100/K_p$

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

[20]

- (1) Give a brief introduction to controllers.
- (2) Give a brief introduction to composite controller mode.
- (3) Write a short note on cycling.
- (4) Discuss the application of PID mode.
- (5) Provide a list of various control system parameters.
- (6) Enlist the important factors for designing of an instrument air system.
- (7) Discuss the applications and disadvantages of PI mode.
- (8) Write a few lines about types of dryers.
- (9) Enlist the characteristics of derivative control mode.

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- (10) Write a short note on pressure level.
- (11) Write a short note on dead time.
- (12) Write the characteristics of Integral Control Mode.

Q-3 Write a detailed note on two-position control mode. What is neutral zone? A controller [10]
 outputs a 4-20 mA signal to control motor speed 140-600 rpm with the linear
 dependence. Calculate the currents corresponding to 310 and 500 rpm.

OR

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

Q-4 (a) Discuss in detail about the three mode(PID) controller. [5]
 (b) Discuss in detail about derivative control mode. [5]

OR

Q-4 (a) Explain the proportional derivative (PD) controller mode in detail. [5]
 (b) Enlist the characteristics of PI mode. [5]

Q-5 (a) Discuss about the sliding vane rotary compressor. [5]
 (b) Discuss about reciprocating type compressor. [5]

OR

Q-5 (a) Explain the air and water cooled intercoolers. [5]
 (b) Discuss about the sizing criteria and air supply required for the designing of an [5]
 instrument air system.

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

