Reg. No. : | | | | | | | | | | |

Question Paper Code: 31762

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Seventh Semester

Instrumentation and Control Engineering

01UIC702 - DIGITAL CONTROL SYSTEM

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is sampled data control system?
2. List any two advantages of digital control system.
3. Define Shanon's sampling theorem.
4. State aliasing effect.
5. What is region of convergence?
6. Define z-transform of unit step signal.
7. Write the properties of state variable model.
8. State the condition for controllability by Kalman's method.
9. Define state observer.
10. Express the transfer function of PID controller.

PART - B (5 x 16 = 80 Marks)

11. (a) Explain the configuration of the basic digital control scheme with the help of block diagram. (16)

Or

(b) (i) Explain the basic discrete time signals used in digital control system. (8)

(ii) Describe any one application of digital control system with suitable example. (8)

12. (a) (i) Derive the frequency response of ZOH device. (8)

(ii) Explain the advantages and disadvantages of sampled data control systems. (8)

Or

(b) (i) Explain reconstruction of sampled signals using Hold circuit. (8)

(ii) Define the following terms: (a) Acquisition time (b) Aperture time (c) Hold mode droop and (d) Settling time. (8)

13. (a) (i) Describe the relationship between S-domain and Z- domain. (8)

(ii) Determine the inverse Z-Transform of the following Z-domain functions $F(z) = \frac{3z^2 + 2z + 1}{z^2 - 3z + 2)}$ (8)

Or

(b) Determine the stability of the sampled data control system represented by the following characteristic equation using Jury's stability test. $Z^4 - 1.7Z^3 + 1.04Z^2 - 0.268Z + 0.024 = 0$ (16)

14. (a) Find out the three different canonical state variable models corresponding to the transfer function $G(z) = \frac{4z^3 - 12z^2 + 13z - 7}{(z-1)^2(z-2)}$. (16)

Or

(b) Explain the concept of controllability and observability with examples. (16)

15. (a) Explain with the help of block diagram digital temperature control system. (16)

Or

(b) Explain with the help of block diagram digital position control system. (16)

———————