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

Question Paper Code: 47602

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2020

Seventh Semester

Instrumentation and Control Engineering

14UIC702 - DIGITAL CONTROL SYSTEM

(Regulation 2014)

Duration: One hour Maximum: 30 Marks

PART A - (6 x 1 = 6 Marks)

(Answer any six of the following questions)

1. A continuous-time periodic signal x(t), having a period T, is convolved with itself. The resulting signal is

(a) Not periodic (b) Periodic having a period T

(c) Periodic having a period 2T (d) Periodic having a period T

2. In the sampled data control system, the controller output is given to

(a) Comparator (b) Process (c) Final control element (d) Zero order hold

3. Shanon's sampling theorem states

(a) $f_s \geq f_m/2$ (b) $f_s \leq f_m/2$ (c) $f_s \geq 2f_m$ (d) $f_s \leq 2f_m$

4. The holding device which uses n^{th} order polynomial for approximation is called

(a) $(n+1)^{th}$ order holding (b) $(n-1)^{th}$ order holding device

(c) n^{th} order holding device (d) Zero order holding device

5. Z-transform of 6 δ (k+2) is

(a) $\frac{6z}{z-2}$ (b) $6z^2$ (c) $2z^6$ (d) $6z^{-2}$

6. The stable region of Z plane is

(a) Inside the unit circle (b) Outside the unit circle

(c) Left half plane (d) Right half plane

7. For the n^{th} order system, the number of state equations will be

(a) 1 (b) n (c) (n+1)/2 (d) n/2

8. A state space model is fundamentally different from transfer function model in account of

(a) Zeroes (b) Single input & single output

(c) Initial conditions (d) Poles

9. The velocity form of PID controller computes

(a) m(n-1) – m(n) (b) m(n-1) + m(n)

(c) m(n) – m(n-1) (d) m(n) + m(n+1)

10. In dead beat controller C(z) / R(z) is

(a) z^{-2} (b) z^{-1} (c) z^{-n} (d) z^{+1}

PART – B (3 x 8= 24 Marks)

(Answer any three of the following questions)

11. With block diagram, describe a digital temperature control system (8)

12. Obtain the inverse Z-transformation of the discrete function (8)

$$G(z) = \frac{Z}{3(Z - 0.333)(Z-1)}$$

13. Compare open loop hybrid sampled data control systems and open loop discrete input data control systems (8)

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14. Obtain the state space model for the given pulse transfer function in decoupled form. (8)

$$\frac{y(z)}{u(z)} = \frac{2(z+5)}{(z+2)(z+3)(z+4)}$$

15. Explain the design of state regulator and observer with suitable examples. (8)