

Bhagwan Mahavir College of Engineering & Technology
Academic Year: 2016-2017
6th sem Electronics
Subject: Digital Control (2161007)

Assignment -1

Submission date: 23-01-2017

1. Explain basic block diagram of digital control system.
2. Explain sampling theorem in brief.
3. Define following terms:
 - a. Sample and hold
 - b. Analog to digital converter
 - c. Digital to analog converter
 - d. Plant/Process
 - e. Transducer
 - f. Quantizing
 - g. Quantization error
4. Draw and explain difference between following signal.
 - a. Continuous time analog signal
 - b. Continuous time quantized signal
 - c. Sampled data signal
 - d. Digital signal

Assignment -2

Submission date: 13-02-2017

1. Explain z-transform in brief.
2. Explain important properties of z-transform.
3. Explain shifting theorem with example.
4. Explain complex theorem with example.
5. Explain initial theorem with example.
6. Explain final theorem with example.
7. Explain mapping of s-plane to z-plane.
8. Explain following methods to obtain inverse z-transform with an example:
 - a. Direct division method
 - b. Computational method
 - c. Partial fraction expansion method
 - d. Inversion integral method
9. Obtain z-transform of following:
 - a. ka^{k-1}
 - b. $\frac{z}{z-a}$
 - c. $\frac{z}{z^2-5z+6}$
10. Obtain inverse z-transform of following:

$$X(z) = \frac{z+2}{(z-2)z^2}$$

Assignment -3

Submission date: 28-02-2017

1. Draw and explain impulse sampler.
2. Draw and explain data hold circuit.
3. Explain pulse transfer function of closed loop system.
4. Explain pulse transfer function of PID controller.
5. Obtain pulse transfer function by using two different methods for the following function:

$$X(s) = \frac{s+3}{(s+1)(s+2)}$$

6. Explain block diagram realization of a filter showing direct programming.
7. Explain block diagram realization of a filter showing standard programming.
8. Explain three approaches to avoid coefficient sensitivity problem for decomposing.
9. Explain block diagram realization of finite impulse response filter.

Assignment -4

Submission date: 20-03-2017

1. Explain in brief stability analysis of a closed loop system.
2. Explain jury stability criteria.
3. Explain bilinear transformation and root stability criteria.
4. Explain state space representation of discrete time system in brief.
5. Explain pulse transfer function matrix.
6. Explain discretization of continuous time state space equation in brief.

Assignment -5

Submission date: 10-04-2017

1. Explain controllability and observability.
2. Write a short note on state observer.
3. Explain quadratic optimal control problem.
4. Explain steady state quadratic optimal control.