

Name: _____

Roll No. _____

Choose only one option which is the most appropriate for questions 1 - 5.

1. In the context of unit step response of a first order system, time constant is the time at which output reaches

- (a) ~95% of the final value
- (b) ~50% of the final value
- (c) ~63% of the final value
- (d) ~99% of the final value

2. Rise time in step response of 2nd order system is defined as time instant when output is

- (a) less than 50% of the final value
- (b) same as the final value for the first time
- (c) a maximum value
- (d) 95% of the final value for the first time

3. Unit parabolic test signal is described in time domain as

- (a) $2t^2$
- (b) t^2
- (c) $t^2/2$
- (d) $t - t^2/2$

4. If a system produces the same output with the same time delay as the time delay in input, it is supposed to following the principle of

- (a) homogeneity
- (b) time invariance
- (c) superposition
- (d) linearity

5. In the general description of nth order dynamical system, the coefficient a_{n-1} multiplies

- (a) $d^{n-1}y/dt^{n-1}$
- (b) du/dt
- (c) $d^{n-1}u/dt^{n-1}$
- (d) dy/dt

Give short (1 - 2 lines) answer to the questions 6-10.

6. Give the expression for unit initial condition response of the following system.

$$T\dot{c}(t) + c(t) = 0$$

$$c(t) = e^{-t/T}$$

..... 2 (PTO)

7. Why is the system response generation important for the design of control systems?

System response generation is important as it establishes the deficiency in the behaviour of the dynamical system which drives the design of control system.

8. What are the main reasons for employing the test signals the context of control analysis and design?

- (1) Normally, inputs are not fully known ahead of time and are also uncertain.
- (2) Test signals are simpler and are able to extract the relevant features.

9. Why are the responses of 1st and 2nd order systems important?

1st and 2nd order system responses have simple description and help us to synthesis the response of higher order systems through application of superposition.

10. Define the order for an LTI system.

Order of an LTI system is the highest degree of derivative of the output.